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EDITORIAL NOTES

TWO PROBLEMS

THERE have been several purposeful and pointed Addresses in the Gas Industry lately, among them the Presidential Address of Colonel F. J. Bywater to the Southern Association of Gas Engineers and Managers which we published in last week's "JOURNAL." His comments covered a range of subjects from air-raid precautions to research, competition, and post-war planning (in regard to the last-named, hoping for an impartial enquiry to hear the evidence of all fuel interests); no doubt they will have been studied, but we would like to say a few words about two of the subjects dealt with by Colonel Bywater—coal and education, both of prime importance to the Industry. It was with the wider sphere of education that he was concerned, and he expressed the view that the vast sums of money spent on education in this country yield a poor return as an investment. Why is it, he asked, that so frequently we hear complaints about the young men who come straight from school into factory, workshop, or office, the while these young men, after training in the Services, make splendid sailors, soldiers, and airmen? Surely, he added, there must be something wrong with a system which is supposed to fit these youths equally well for civil life, but which apparently fails so frequently in its results.

There may perhaps be a tendency in the foregoing comparison to confuse warlike and peaceful activities, and we cannot think that those in "civil" jobs in wartime are in general showing lack of devotion to their country and their fellow men, however misunderstood they may be by their uniformed fellow citizens. Surely we are citizens all. And it is well to remember that educational facilities are not education. We are reminded of the three jobs of life which we suppose men and women ought to have. In each case—men or women—the "most obvious is to earn a living." We quote from a broadcast some time ago by Sir Richard Livingstone on the purpose of education. Education should train us to do the work by which we earn our living. Therefore, we need facts. Colonel Bywater said: "Our education is largely a mechanized affair, consisting of packing heads with facts, while little attention is given to real education . . . " (p. 411, "JOURNAL" of March 31). Another sentence on the same page read: "The Institution will require from those seeking admission a certain standard of technical and educational qualifications comparable with that required by other scientific institutions." Which surely implies a knowledge of facts—"heads packed with facts." In our opinion the Gas Industry needs facts, and needs education in the interpretation of facts. It also needs to recruit to its ranks men of general education.

We have mentioned one job of life—to earn our living. But we are not educated when we have learned that art of expediency. We must be trained to think in terms of citizenship, and this we regard, as does Colonel Bywater, as the outstanding failure of the national education scheme in recent years. We must be able "to enter quickly into the minds of others and *understand views which we do not share*." This quotation is also from Sir Richard Livingstone's broadcast; we have italicized a few words which strike us as being of especial significance. Of course, there is the third job, religion and philosophy. That is fundamental but beyond the ambit of this note.

We turn to coal, essential to the Gas Industry, and quote this from Colonel Bywater's Address: "We have seen millions of tons of coal exported every year to be carbonized and stripped of its valuable by-products, and every encouragement given by Government and colliery companies for the development of this trade. In fact, there have been numerous occasions when first-class gas and coking coal was being received on the Continent at a price lower than it could be bought in London." We suggest that in this there is something to think about—and something which requires to be put on a more rational and scientific basis.

The reason for this anomaly was well enough known. To keep our mines at work and to provide work and wages for the mining community, this export trade was a necessity. In the free market of the world it could, however, be obtained only in open competition with fuels produced by countries which had a much lower standard of living than our own. Prices, therefore, were largely unremunerative. On the other hand, home gas coal trade was more or less "controlled," whether by Government decree or by the fact that the coal trade held the monopoly of it as far as this country was concerned, and in consequence the Gas Industry was compelled to pay up and look as pleasant as it was able. Perhaps in the wonderfully planned post-war world such problems will be settled amicably by the comity of nations in the best interests of all concerned. Perhaps.

ELECTRICITY POST-WAR

LAST week we referred to the ideas of the electricity industry in regard to electricity post-war as expressed by company chairmen in their speeches at annual meetings. Since then further meetings have been held and further but similar views have been put forward, and again the plans of the London and Counties Joint Electricity Authority (outlined in the "JOURNAL" of March 10) have come in for no uncertain criticism, as witness, for example, Lord Ashfield's address to shareholders of the Northmet Power Company. To play its part in the field of post-war reconstruction, electricity, he remarked, must be so organized that initiative and enterprise and experience and knowledge may be brought to bear on the difficult problems that will inevitably arise. And he pointed out that the history of the industry shows that private enterprise has made a most valuable contribution to the development which has taken place and to the level of technical skill which has been attained, by its willingness to take risks and by its insistence on initiative. Expansion in the use of electricity is to be expected after the war; no doubt there will be many important technical developments, but "if technical progress is to be stimulated the pioneering spirit of private enterprise must find expression in the future organization of the industry." Lord Ashfield went on to say that wholesale reorganizations such as that proposed by the Joint Electricity Authority might well delay improvements which it is within the power of the existing undertakings to effect immediately with the co-operation of the Government. What he asked for was development of the industry by the co-ordination of the publicly and privately owned undertakings, and the delimitation of their respective spheres of influence on the lines recommended by the McGowan Committee in 1936—a report which "remains the most complete and weighty pronouncement that has so far been made on the future of electricity supply."

Then we had the speech of Mr. William Shearer as Chairman of the Scottish Power Company, who also maintained that the McGowan report is still the soundest and most authoritative recommendation for obtaining greater efficiency in distribution, and expressed pleasure that the Cooper Committee, after examining various possibilities in regard to Northern Scotland, rejected the proposal that existing undertakings, whether company or municipal, in that area might be merged in a new public corporation, rejecting it for the same reason that influenced the McGowan Committee in dismissing so drastic a "solution" for the country as a whole—namely, that it would create serious and needless dislocation in electricity supply without any compensating benefit to consumers. But he mentioned that influences are at work with the avowed intention of eliminating

all private enterprise supply, and it may be that of municipalities also, "for the satisfaction of furthering political shibboleths and, it may be, of gratifying the aspirations of some individuals who under the guise of so-called 'public ownership' might like to take possession or obtain the directing control of what they no doubt regard as a 'Naboth's Vineyard'." He hoped that the Minister of Fuel and Power would lend no ear to such ill-considered proposals; at the same time he urged the need for companies and municipalities to present to the Government a united front.

With such insistence on the virtues of the McGowan report we may well recall a few of the recommendations which that committee made seven years ago, for they so obviously have a bearing on the future of the Gas Industry, which, too, must present to the Government a united front, and that without loss of time. The chief items, at any rate in their bearing on the Gas Industry, appeared to us to be, first, the existence of too many separate authorized electricity undertakings, the stultifying influence of the rights of purchase by local authorities, and the unequal facilities throughout the country for the hire purchase of appliances. The second important point was the committee's insistence on the co-ordination of local authority and company undertakings. We recall the view, strongly expressed, that the voluntary basis of reorganization was bound to fail, and the suggestion made that, though improvement must necessarily be gradual, the future might see the ultimate public ownership of all electricity undertakings, including those not subject to purchase by local authorities—which idea seems to have been overlooked in the speeches to which we have just referred. Nor in either of the addresses was any mention made of a document issued in 1937 by the Government, a document freely dubbed at the time a "secret White Paper," which seemed to advocate a scheme planned towards complete nationalization of the electricity industry. However, our point is not to enter into any detailed discussion of electrical plans, but merely to mention them as a guide to Gas Industry thought and, we hope, as something of a spur to its activities; and we would emphasize once again the paramount need for a united front, and the speedy formulation within the Industry of a constructive plan to put forward for Government consideration.

Role of the Chemical Engineer

An interesting speech was made by the Minister of Production, Mr. Oliver Lyttelton, at the annual luncheon of the Institution of Chemical Engineers held in London on Friday last—an event attended by a large number of eminent scientists and engineers in many fields of work. Mr. Lyttelton remarked that our country has always been in the forefront of fundamental scientific research, and there is every reason to hope that we can retain this supremacy. But the application of the results of that research to practical needs has sometimes, in the past, been left to the technicians of other nations, so that we have not reaped the full benefit of our own fundamental discoveries. It is here, he maintained, that the chemical engineer must increasingly play his part, in peace as in war, by creating from the discoveries of the chemical research laboratories new and effective processes based on materials that are economically available to us. Our own industrial greatness has been built on coal; and coal will have to remain the principal basis of our chemical industries.

Scotland's Gas Development Centre

It was with much gratification that we announced as we went to press last week (*ante*, p. 413) that a Scottish Gas Development Centre had been established in Glasgow, with Mr. David Fulton, of Helensburgh, as Chairman of the Advisory Committee. We wish the Centre all success—and success would appear to be assured judging from the enthusiastic support which has marked its inception. The Centre will deal with both industrial and domestic matters, and it will doubtless prove of great benefit to undertakings in Scotland. So far, 80 gas undertakings have grasped the opportunity of affiliation, representing something like 80% of the total gas manufactured in Scotland, and numerically the Centre is one of the largest in the United Kingdom. We feel sure that a wide field exists for industrial gas in many parts of Scotland, and we confidently anticipate that the new Centre will perform excellent service for the Industry. We would add that in our opinion membership should not be 80%; the percentage ought to be one hundred.

Personal

Col. H. C. SMITH, J.P., M.Inst.C.E., has been appointed General Manager of the Tottenham and District Gas Company. He retains the appointment of Chief Engineer.

* * *

Following the resignation of Mr. H. W. ALLEN from the position of Engineer and Manager to the Tiverton Gas Department, Mr. F. E. Cox, previously in charge of the Royal Arsenal Gas-Works, Woolwich, and, before that, Engineer and Manager to the Newport (I.O.W.) Gas Company, has been appointed to the post at Tiverton.

Gas Research Board

Appointment of Director

The Council of the Gas Research Board has appointed Dr. James Grieve King, A.R.T.C., F.I.C., Superintendent of the Fuel Research Station, East Greenwich, to be Director of the Gas Research Board.

Dr. King, who is 51 years of age, is a native of Scotland, where he started his career as Assistant to Professor T. Gray at the Royal Technical College, Glasgow, from 1912 to 1914. During the war years 1914–19 he was Chemist and finally Departmental Superintendent of Nobel's Explosives Company, Ltd. He joined the staff of the Fuel Research Station as Research Chemist in 1919, becoming Chief Chemist in 1920, and Superintendent in 1941. He has a wide experience in the field of fuel technology and is well known to the Gas Industry. The long list of his published researches includes a number of papers presented, either alone or in collaboration, at Autumn Research Meetings of The Institution of Gas Engineers. His joint Paper with the late Eng.-Captain J. F. Shaw, on "Recent Experiments at the Fuel Research Station upon Production of Solid Smokeless Fuel," was awarded the Institution Gold Medal for 1934, and his joint Paper with Mr. James Jamieson, on "Products obtained by the Carbonization of Scottish Cannel in Continuous Vertical Retorts," was awarded the H. E. Jones London Medal of the Institution in 1936. Among his earliest publications was a joint Paper, with Professor T. Gray, on "The Assay of Coal for Carbonization Purposes," which described the now classic Gray-King apparatus.

Appointment of Joint Assistant Director

The Council of the Board has appointed Dr. Frederick James Dent to be Joint Assistant Director of the Board.

Dr. Dent is 37 years of age and is a native of Leeds. He obtained the B.Sc. degree in Gas Engineering at Leeds University in 1926, the Ph.D. degree in 1929, and was awarded the D.Sc. degree in 1939. He won the Arthur Smithells Research Scholarship and the Le Blanc Medal in 1927, and was Institution Gas Research Fellow from 1927 to 1929. Since 1929 he has been a Research Chemist of the Institution and more recently of the Gas Research Board, engaged upon investigations for the Joint Research Committee.

Dr. Dent has taken an active part in various aspects of the life at Leeds University, where he has also given special lectures on water gas manufacture in the Department of Coal Gas and Fuel Industries.

The time must come when the Board will require a physicist and perhaps also experts in other fields of investigation; such experts when appointed would occupy also the position of Joint Assistant Directors.

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Page 24. EBBW VALE. G. A. Phillipson, *E. & M.*
„ 46. MILFORD HAVEN. J. H. Daniels (Canterbury), *E. & M., vice* R. J. Calderwood, retired.
„ 88. KIRKCUDBRIGHT. A. G. Arnott (Dalbeattie), *E. & M., vice* W. Balfour, deceased.
„ 115. GAS CONSOLIDATION, LTD. C. B. Mawer, *S., vice* C. P. Dawnay, resigned.
„ 116. SEVERN VALLEY GAS CORPORATION, LTD. C. B. Mawer, *S., vice* C. P. Dawnay, resigned.

Manchester District Association

The 73rd Annual Meeting of the Manchester District Association of Gas Engineers was held in Manchester on April 2—Mr. J. E. Lister Cooper (Yeadon) presiding.

The following new members were introduced: Frank S. Charnley, Engineering Assistant, Liverpool Gas Company; R. S. Cureton, Resident Engineer and Manager, Northwich Gas Company; C. A. Newham, Works Manager, New Wortley Works, Leeds; W. Oldham, Engineer and General Manager, Fleetwood; J. A. Seabrook, Engineer, Manager and Secretary, Elland.

In its Annual Report the Committee recorded, with regret, the death of Mr. W. L. Heald, Preston, who had been a member since 1913, and Mr. W. H. Handley, Elland, who had been a member since 1936. The membership is now 192, an increase of seven.

In the course of the Report it was stated that closer liaison between the Affiliated District Associations and The Institution of Gas Engineers had been established.

A Sub-Committee was set up to explore the position regarding the recognition of the agreed scale of salaries of gas engineers, to make recommendations for an extension of the scale to works of 5,000

million cu.ft. annual output, and to co-operate with other District Associations in devising means of implementing an agreed scale. A joint meeting with the Midland and North British representatives was held, and in subsequent developments the Committee was greatly indebted to Sir Frederick J. West for his assistance.

In response to the request of the President of the Institution a special meeting of the Committee was called to consider the advisability of setting up District Advisory Boards. It was decided to support the proposal and nominations were made.

The report was adopted on the motion of Mr. F. G. Shaw (Buxton), seconded by Mr. Dickinson (Widnes).

The Statement of Accounts submitted by Mr. Burton showed that the balance in hand had been increased by £63, the income being more by £41 and the expenditure more by £45, the increase in the latter being chiefly due to the higher subscription to the Benevolent Fund and the additional meetings of the Committee, seven having been held compared with two in the previous year.

Mr. T. Reynolds (Stockport), in submitting the report of the Lancashire Commercial Section, remarked that widely varying problems had been discussed by the Section.

Mr. G. E. Currier (Bradford) presented the report of the Yorkshire Commercial Section. The Commercial Sections, he said, had been in operation for a number of years, and had fulfilled their function of providing a frank open platform where problems could be discussed freely. He hoped that in the reorganization of the Gas Industry a useful place would be found for the Sections.

The next item was, said the Chairman, one arising out of an arrangement which had proved beneficial to everyone concerned—namely, the presentation of the report of the District Member of the Council of The Institution of Gas Engineers. Having given a summary of the various matters discussed by the Council, he observed that the question which had possibilities of great benefit to the Industry was the setting up in each District of an Advisory Board in order to ensure the best use of coal and oil in the interests of fuel economy. He would urge upon them all the importance of complete co-operation between the gas undertakings and the Boards in this matter.

The Committee recommended that a donation of 25 guineas be granted to the Benevolent Fund of The Institution of Gas Engineers.

Mr. T. R. Cook (Blackpool) moved, as an amendment, that the sum be raised to 35 guineas.

Mr. G. E. Currier (Blackburn) seconded and the amendment was carried *nem. con.*

Mr. William Fletcher (Liverpool), the President-Elect, was appointed District Member of the Council of The Institution of Gas Engineers.

Messrs. R. Walker (Manchester) and N. Hudson (Mirfield) were appointed representatives of the Association on the councils of the Manchester and District and Yorkshire Junior Gas Associations respectively.

Messrs. C. H. Bamber, W. Fletcher, F. G. Shaw, and R. Walker were appointed representatives of the Association on the Lancashire District Gas Education Committee.

Messrs. J. Corrigan, G. E. Currier, W. B. Harrison, and N. Hudson were appointed representatives of the Association on the Yorkshire District Gas Education Committee.

Messrs. L. W. Harrison and R. N. Webb were appointed representatives of the Association on the Barnsley Advisory Committee of Coke Oven and Chemical Works.

The Chairman moved a vote of thanks to the retiring representatives for their services during the past year. Col. W. M. Carr seconded.

Induction of President

The Chairman, in investing Mr. W. Fletcher (Liverpool), with the President's badge of office, remarked that the President-Elect had been a member of the Association for the past 23 years.

Mr. Fletcher said he greatly appreciated the honour done him in electing him as their President. In turn it was his duty to express to Mr. Lister Cooper the sincere thanks of the members and appreciation for the work he had done.

Mr. Lister Cooper responded.

Col. Buckley (Chairman of the Liverpool Gas Company) paid a tribute to Mr. Fletcher on his induction to the office of President. The Company was proud of the distinction conferred upon one of its representatives.

Mr. Fletcher thanked Col. Buckley for his remarks. He then delivered his Presidential Address (see p. 430).

Mr. Norman Hudson, Senior Vice-President, moved a vote of thanks to the President for his Address. Mention had been made of coke, and they all realized how dependent their revenue balance was on coke sales. Very careful attention had to be given to the quality of the coke they sold, and the quality of the coke was dependent on the quality of the coal received. An enormous amount of time could be devoted to minor improvements in the quality of coke, but this would be of little avail if they were compelled to take coal which, initially, was unsuitable for the making of good domestic smokeless fuel.

Mr. C. H. Bamber (Junior Vice-President) seconded.

Mr. Appleyard (Leeds) proposed a vote of thanks to the retiring Officers and Committee.

Mr. Restall (Stalybridge) seconded, and Mr. Burton, responding, expressed satisfaction at the appointment of Mr. Haworth as his successor.

Association of Tar Distillers

At the Annual Meeting of the Association, Mr. C. E. Carey, of the South Metropolitan Gas Company, was elected President for the ensuing year. In the course of the annual report for the year 1942 it is stated that the increased demand for practically all tar products, noted in the last annual report, was fully maintained and in most cases extended. The Association had maintained the closest contact with the Coal Tar Control, receiving and providing advice and assistance whenever opportunity occurred. At the same time the Association maintained its contacts with other Government Departments, trade associations, and other bodies having mutual interests.

Two new committees were formed during the year. The Coal Tar Bituminous Products Sub-Committee was appointed to prepare recommendations and relevant technical information on the replacement of asphaltic bitumen by coal tar products. The Sub-Committee has acted in an advisory capacity on the B.S.I. Panels engaged in the compilation of specifications for coal tar products which are used in replacement of bitumen. It is considered by the Sub-Committee that these products should maintain their position on their own merits, but that that will depend almost entirely on the industry's supplying first-class preparations and ensuring that they are properly used by consumers.

The National Transport Committee has recently been constituted on the basis of regional representation to secure co-operation of the regions on transport problems. It is hoped that it will be possible for this Committee to formulate a scheme of a well-defined nature which will be able to co-ordinate and supplement the regional efforts to meet transport problems as they arise.

Wartime Organization

The general "Control of Coal Tar Order" was issued in revised form during the year; other Orders appearing during the year covered prices for naphthalene, anthracene, tar acids, naphtha and xylole, and road tar. These were, of course, all the subject of appropriate attention by the Executive Committee as they appeared. Several of the Orders gave rise, prior to their appearance, to the formation of committees of members of the industry by the Coal Tar Control, and in this way the Controller was in a position to formulate the Orders in the knowledge of the Industry's position in relation to his proposals.

The operation of certain of the Orders and the planning of distribution as distinct from price control of the products concerned have called for detailed co-operative activity by the industry through such bodies as the National Creosote Committee and the National Road Tar Committee. On different grounds the industry has found it desirable to set up a National Transport Committee to deal with the pressing problem of transport facilities. The maximum efficiency of operation on an individual and collective basis will be needed to cope with the increasing quantities of materials that have to be moved throughout the country; this refers particularly, of course, to the increased amounts of tar fuel oils produced, and, more recently, the movement of ingredients (base tar and creosote, particularly the former) from points of production to other points where they can be blended into tar fuel oils.

The regional committees have continued to intensify the regional co-operation which started with planning for mutual help in the event of enemy attack, especially air attack, but which in the relative absence of such disturbance developed very considerably during the year in every direction where regional activities assisted the regional or the national efforts of the industry. The Controller has continued to avail himself of the services of the Association to supplement activities carried out wholly within his own office; and he has continued to consult the industry in the many directions where his activities have broken new ground.

Tar Products

(a) *Tar Fuel Oil.*—In the early part of the year, after extended discussions, a contract and Memorandum of Procedure for the supply of tar fuel oil to the Petroleum Board was in all its aspects agreed with the Board; these negotiations were conducted on behalf of the Industry through the Negotiating Committee of the National Creosote Committee.

(b) *Pitch.*—The extended use of pitch directly as fuel in certain directions has continued to engage the attention of the industry, but Association activity in the use of pitch has, during the year, been directed more intensively to its replacement of asphaltic bitumen in a number of directions. The work of the Coal Tar Bituminous Products Sub-committee has opened up many new uses in connexion with constructional work. Properly developed in actual production and treated as carrying a considerable measure of responsibility on tar distillers to produce satisfactory material and ensure the proper servicing of the market, this new field offers opportunities of a first-class and permanent nature. The Association is actively represented on the B.S.I. Committees which are preparing specifications for various tar products used as or in constructional materials. It is co-operating in carefully planned field trials in directions of use for which there is insufficient past experience.

(c) *Tar Acids.*—The extraction of tar acids and the production of

(*Continued on p. 432*)

MANCHESTER DISTRICT ASSOCIATION OF GAS ENGINEERS

Presidential Address*

of

W. FLETCHER, Liverpool

EVERYONE here to-day will appreciate the many dislocations and difficulties arising from the war and resulting additional work and worries caused thereby. All of these may at present tend to prevent a more active concentration on the activities of this Association, but the war will not last for ever.

The first duty of the Industry and of the community as a whole is to terminate this war successfully and as soon as possible. In the meantime, we can prepare for the peace by considering our Industry, its future, and the service which we know it is able to render in a nationally devised supply of fuel to the domestic and the industrial consumer.

Dr. Smith, when Director of Gas Supply, indicated that the Industry is expected to devise a scheme to form the foundation of the modifications which everyone with a knowledge of the existing organization has already agreed to be necessary. Never before has such an opportunity to state our potentialities been presented; our energy must therefore be directed towards assisting, when called upon, to the maximum of our individual knowledge and ability in the collection of the data which will demonstrate the national importance of our Industry and the service which it can render.

We might each then, anticipating the need, consider a series of subjects and analyze our views upon each. Matters which will require our consideration, discussion, and decision are gas service, the education of the consumer, potential domestic demand, coke, gas production efficiency and economy, personnel, research, and post-war development. We must clarify our views and define policies upon these matters in order to demonstrate the primary importance of our service in the post-war era.

Gas Service

The views on gas service of the average consumer are not a credit to the Industry, and we must devote ourselves to the task of educating him and her by advice and propaganda, but primarily by the improvement of the service which we render. The average consumer notices variations in the operation of his appliance. He does not and should not be expected to know of the causes of the variable performance, and it is our business to see that his appliance does all that it is intended to do. We know that in certain circumstances it will, and we must provide those conditions and ensure that they are permanently maintained. We shall then be on the way to educating the user, and his attitude to gas will undergo a radical change.

The factors which govern appliance performance are well known to us all; but do we appreciate the effects of these changes separately and collectively, and the consequences when variations occur in any one or all, upon the results which the consumer obtains? We must, as a preliminary to the almost infinite development of our Industry which we know to be possible, familiarize ourselves with these variables and their effects, place ourselves in the position of the user, and reach our own conclusions. The energy which we shall then individually direct towards the standardization of appliance performance will, in combination, educate and in many cases surprise the consumer, to our mutual benefit. This energy must commence on the works and permeate our organization to the point of utilization.

These variables are, of course, pressure of supply, calorific value, specific gravity, and composition which determines the combustion characteristics of the gas.

We have recently had the Report of the Institution Committee on Standardization of Gas Quality published in the Press, and the conclusions specified therein may not, I suggest, achieve the necessary standard; the recommended maximum variations in all the factors are rather wide and they will most certainly be criticized. This report and the discussion which it provokes will, however, be a most useful guide upon which to judge the intentions and prospects of the Industry.

It is suggested that maximum variations of the following order should be adopted to ensure consistent appliance operation:

Pressure . . .	5 tenths (minimum 25 tenths).
Calorific value .	2%.
Specific gravity .	2%.
A.T.B. . . .	10%.

The average consumption per consumer will commence to rise when some close approach to the maintenance of these conditions is achieved throughout the Industry; and the ultimate figure will depend upon the adoption of a scientific method of charge, which is not the immediate concern of these comments.

The P.E.P. Report (1939) estimated the average consumption per consumer to be "in the neighbourhood of 100 therms per annum," and divides this quantity between ordinary and prepayment consumers in the proportion of 135 therms and 90 therms per annum. The report continued that these figures leave a very great margin for expansion, and suggested that an adequate supply of gas for all heat services—*i.e.*, cooking, water, space heating, and incidental services—would require at least 500/600 therms for an average household. In existing working-class property at that time it was found that 200 therms would cover the demand for cooking, hot water, and occasional bedroom heating.

Other authorities have analyzed the possibilities and reached conclusions of the same order, and the President of our Institution, in his recent Address to this Association, visualized the potentialities of the Industry in a broader sense. In these expressions of opinion or, as we might say, statements of fact, we gain some idea of our destiny as an Industry and as a service to the community.

Elimination of Sulphur

Enough has already been said on this important subject, but it might be stressed again that the elimination of this impurity would, quite apart from other advantages, enable portable flueless appliances to be sold with confidence.

Coke

We must presume that our main products will consist of two rectified fuels for many years to come, and we may prophesy that the solid smokeless fuel may become equally if not more important than the gaseous fuel in a properly devised national fuel policy.

The Institution Committee on Coke Quality has published the first part of its recommendations, and these will assist materially in the standardization of the product. The further conclusions will be awaited with interest, but our individual energies can anticipate these in order to modify the position at the earliest possible moment and with post-war conditions in mind.

Having agreed that all carbonized fuels shall be adequately graded, the first decision to be taken concerns the quality of the fuel to be supplied in respect of combustibility and ease of ignition. Continuous vertical retorts produce a coke which is inherently more combustible than that from horizontal or intermittent retorts, the reason for this being that the heat treatment which the coal receives is less severe; also that the fuels which are most suitable for this type of plant are those which yield a coke of greater combustibility than the gas and coking coals normally used in horizontals. Further improvement in combustibility can be achieved by special selection of the coal used in the vertical retort.

We must admit that the average sample of coke, whether *ex* vertical or horizontal plant, while suitable for industrial purposes and central heating, is not a satisfactory fuel for open domestic fires even when properly graded.

It is no part of my duty now to define a policy in this matter for the Industry and still less for the Nation, but merely to provide food for thought, and on this point we must decide as quickly as possible upon our recommendations.

We can supply an open grate fuel, the quantity being dependent upon the availability of suitable coal and carbonizing plant. Alternatively we shall continue to manufacture a relatively incombustible fuel, upgraded in quality by control of moisture, ash content, and size grading, but which requires special appliances for its satisfactory utilization. It we assume that apparatus (perhaps similar in principle to the anthracite stove) is designed which will enable the combustion of such coke to be maintained and controlled at a suitable rate for domestic uses, we cannot imagine that such a proposal will meet with the requirements of the public and add materially to the demand for domestic purposes, nor will it assist in the solution of the smoke problem.

In order to improve the domestic coke market in our area it was decided to market a fuel easily combustible in existing domestic grates rather than push specially constructed coke-burning grates. As a result, "Dryco" was introduced in 1930. Without any intensive sales campaign, the sales increased from 3,000 tons in 1931 to 16,000 tons in 1940. The fuel graded through 2 in. on $\frac{5}{8}$ in. is supplied in sealed bags each containing 1 cwt., and is guaranteed to ignite with 4 cu.ft. of gas. A graded vertical coke of the same size as "Dryco" is also made and marketed, and the sales of this are increasing rapidly.

With the increasing demand for sized coke, the make of breeze is greater than ever; its disposal is a matter of concern, and unless a steady market for it is developed, this concern is likely to increase. Unfortunately there is no set standard size for breeze, and the result is chaos. In some districts the size ranges from 1 in. down to dust,

* Delivered on April 2.

while in others the size is ⅛ in. down. This disparity in sizing is not beneficial to the trade, a buyer not knowing what he will receive. It has been found in Liverpool that breeze of ⅛ in. down is quite capable of meeting all the demands that may be made.

The selling position would be easier if regular supplies could be guaranteed. As it is now, in the summer months when coke sales are low and stocking is taking place, breeze supplies frequently fail to meet the demand, while in the winter the position is reversed. Our immediate policy should, therefore, be to fit the fuel to the demands of the community by supplying a fuel which can be used successfully in existing apparatus. Such procedure would eliminate difficulty and expense incurred through accumulations of coke, and it might even require coal to be carbonized primarily for the production of coke, when the excess gas would be utilized to heat the settings, as is the case in the coking industry.

I am sure that every member of our Industry will agree with me that it is most regrettable that Dr. E. W. Smith has found it necessary to resign his position as Director of Gas Supply. Dr. Smith, in the short time he has held that very responsible post, has inspired the whole of the Industry with confidence and hope that at last we have a real place of importance in the affairs of the country, and I feel sure we would all wish to thank him for what he has been able to do while in office.

Gas Production Efficiency and Economy

The late Director of Gas Supply entreated us to increase our efforts to conserve fuel in the national interest by achieving the maximum possible efficiency in the production of gas and in all our subsidiary fuel-using operations. The practical overall efficiency of the Industry as a whole does not perhaps approach the theoretical figure for the process which we operate, and there must be enormous possibilities for the conservation of fuel which vary with the plant and staff at our disposal.

Gas Advisory Boards

It was the wish of the late Director of Gas Supply that undertakings who are experiencing trouble of any kind and whose results are not up to standard, should take full advantage of the newly-formed Advisory Boards. Many troubles may now occur due to inadequate or inefficient plant which it is not possible to replace under war conditions; also possibly due to shortage of staff who are normally available to deal with technical problems. The purpose of the Boards now set up in each Region is to assist in a consultative and advisory capacity, and in some cases this may be supplemented with practical assistance which may enable major savings to be achieved. Engineers may approach their Area Board with the knowledge that their problems will receive the most confidential and careful consideration.

Already the Board set up in the Midlands has, as you are no doubt aware, been functioning most successfully for some time.

A Memorandum on Fuel Economy has been circulated to the District Advisory Boards by the late Director of Gas Supply, which serves as a reminder of many points to be watched in the working of horizontal and continuous vertical retorts and water gas plant, while economy in steam generation and utilization is also dealt with.

The first reaction to this memorandum may be that the points raised are very elementary and, in fact, normal practice, yet how many of us can truthfully say that all the points mentioned are actually carefully and continuously observed? Man's nature being what it is, it is very easy to slip from the straight and narrow path in these matters.

Any gas engineer who feels that this organization can be of use to his undertaking should consult Mr. Haworth, Honorary Secretary, No. 10 Region, Gas Advisory Board, who will set the requisite machinery in motion.

If the Industry is to be developed as we anticipate, it must not only be in a position to give the consumer an efficient and reliable service with the best possible appliances, but must also provide this service at a competitive price.

The theoretical efficiency of gas manufacture leaves us at no disadvantage compared with our competitors, but the advantages of electricity for domestic lighting are considered by the majority of householders to justify paying an enhanced price for current used for this purpose. This provides a considerable source of revenue to our competitors, and allows them to reduce their charges for current where gas and electricity are competitive. It is essential, therefore, that full advantage should be taken of the higher efficiency of gas manufacture, and that labour costs should be reduced to a minimum in order to provide the consumer with the cheapest possible gas.

The efficiency of gas manufacture in any works is primarily the responsibility of the plant designer, the operating engineer, and the chemist, but must be coupled with economy in capital outlay and labour costs if gas is to be manufactured economically.

Many valuable papers have recently been given on plant operation, but it is possible that some undertakings are not sufficiently alive to the importance of properly planned works layout, plant, and equipment. The shortage and high cost of labour, coupled with the reduction of interest rates on capital, have completely changed the pre-war balance between capital and revenue charges, and it seems likely that these will never be fully restored. It is well known that the capital and operating cost of most engineering installations falls on a capacity basis as the size of the installations increases, and this has been exploited to a large extent by the electrical industry in their grid scheme. It seems obvious that the Gas Industry will have to fall into line to some extent if gas is to be made available throughout the country at an economical price. It would appear, therefore, that the time is now ripe for gas engineers to plan for the post-war development of the Industry in their locality, taking these factors into account and exercising care in the layout of new plant to reduce labour charges to a minimum. This is particularly important if the work is of the heavy manual type, as it would appear probable that this kind of labour is likely to become more and more scarce as education is extended.

The handling of coal, coke, and oxide on many works calls for a large proportion of the manual labour available, and my own Company has over a number of years taken steps to reduce this as much as possible, with very satisfactory results.

Coal Handling

Some years ago the handling of coal in and out of stock was almost entirely carried out by manual labour. The irregularities in deliveries which have occurred in recent years, due to strikes, the rearmament programme, and now the war itself, have resulted in increased use of mechanical handling. As an example, it might be mentioned that loading and handling of coal into wagons which formerly required from 20 to 30 men is now being carried out by a Diesel-driven, creeper-track grabbing crane, which requires one driver and one trimmer. We now have three of these machines in use and others are on order. These cranes have a maximum working radius of approximately 25 ft., which means that coal can be put into or taken out of stock up to a distance of 50 ft. from the centre of the railway track, and when coal has to be deposited or removed from land at a greater distance than this from the railway sidings, portable band conveyors and elevators used in series are brought into operation. By this means we are in a position to handle all our coal by mechanical methods.

Much has already been said of the necessity for improving the quality of coke supplied for the domestic market and the extra care required in the grading, stocking, and bagging of our product. In many works coke-handling equipment put in years ago to deal with this work as it was then conceived, is totally inadequate to meet the requirements of the present day. The product can be much improved by the installation of modern coke-handling plant, and in addition a considerable proportion of the labour now employed can be eliminated. As an example of this we have recently installed a grading, storage, and bagging plant which has reduced the labour involved in coke handling at one of our works by over 50%. In addition, the handling of coke from stock has been greatly eased by the introduction of mechanical shovels. These machines have been found to be particularly useful due to their mobility and ability to tackle small jobs even when widely scattered.

Generation of Electricity

Increased labour costs have considerably affected the economics of many processes, and as an example of this it might be mentioned that on checking the cost of electric power generation it was found that the cost of the necessary attendance on the smaller units outweighed any saving in generating current.

Many gas-works have been developed to use direct current at low voltage. This involves high cable costs as well as the use of expensive direct current motors which, due to their construction, require considerably more maintenance than the equivalent induction motor. If the cost of generating current on the works is found to exceed that for which it can be purchased, it will be necessary to use mercury arc rectifiers to convert the incoming A.C. supply; alternatively, new motors and wiring suitable for A.C. must be installed. Although more expensive in first cost, this will eliminate rectifier losses and save considerable capital cost of future electrical installations, but it will also involve the conversion of the existing generating plant to provide A.C. current in case of failure of the external supply.

We have found it economical to purchase current for three of our smaller works, and for the duration of the war current is being rectified for use with the existing motors, but it is proposed to replace existing D.C. equipment upon the termination of hostilities.

Fuel Economy

One of the purposes of the Gas Advisory Board is to carry into effect a national policy of fuel economy. While fuel economy under war conditions must in most cases be limited to working the existing plant under the best possible conditions and in the most efficient manner, in normal times the scope for fuel economy would cover a much wider field, and therefore, in future planning, much thought must be given to this problem.

The achievement of maximum economy in steam and power consumption requires careful investigation, and it is obviously necessary to conserve all available sources of heat. At present many gas undertakings using horizontal retorts are not recovering waste heat from the settings, and for the information of those in this category, I would mention that we have recently installed a waste heat boiler plant on two benches of horizontal retorts which has proved most successful.

Among other sources of heat loss is the all too familiar practice of putting in steam-driven plant requiring great lengths of steam main. In such cases the condensation losses must far exceed the steam advantageously used.

Personnel

The present position is beset with the difficulties which affect the whole nation, but the Industry must ensure that in the future it attracts an adequate proportion of the most intelligent youth available. The most recent reports of the Board of Examiners under the Education Scheme of the Institution have been depressing documents; they have severely criticized the educational standard of the candidates as a whole. This result probably originates in the attitude to the Industry of the average citizen, who believes that it is antiquated and cannot survive much longer. He is therefore unwilling to place his son in such a profession. This view must be modified, and can be done by demonstrating in a practical way, by the service which we render, that the Industry will long outlive the present generation. We are in many cases quite a long way on the road to the achievement of this aim, and the development and expansion which are possible when our energies are properly co-ordinated with the other fuel industries, will ensure an adequate supply of recruits to both the technical and commercial branches of the Industry which will maintain its progress.

It is suggested also that the totally inadequate salaries paid in the gas profession have been largely responsible for the lack of the right type of personnel recently attracted to the Industry. As we all know, a Committee is in being to draw up a scale of salaries which will justly remunerate the gas engineer for his services. Much work has been done in this direction by a Past-President of The Institution of Gas Engineers who is also a member of this Association, in collaboration with many other progressive engineers.

It will be wise to encourage the study of chemical engineering, in addition to the syllabus of the Institution in Gas Manufacture and Supply, in order to produce the most valuable range of knowledge which is necessary to deal with the technicalities of the Industry. Individuals specializing in chemistry and in mechanical and civil engineering will also find problems worthy of their most advanced studies.

Those of us who now have the responsibility of making appointments must first honour our obligations to those now on active service and particularly to the returning student, and at the same time establish a standard of recruitment and remuneration which will be worthy in the future of the most capable personnel available.

Research

During a long period the facilities for research were far from adequate. The intention to improve this position was apparent at the commencement of the war with the formation of the Gas Research Board, and it can be said with certainty that this organization, comprising as it does representatives of the manufacturers of appliances and plant in addition to those of gas supply authorities, will render an inestimable service to the consumer, the Industry and the nation. Previously the Gas Investigation Committee of the Institution had, together with the technical staffs of some of the largest undertakings, provided valuable new knowledge; but the combined scope was limited, and in any case it was not perhaps extensively appreciated and utilized. Now, however, there is apparent a very modified attitude, and the aims of the Gas Research Board will, when carried into effect, extend a research service which will be worthy of the most progressive policy.

We read of the research programme of the coal industry and, incidentally, of the potential cost of this over a specified period, and we must ensure that our organization is capable of collaborating with this and all other research workers with similar interests, in order to develop a sane and efficient fuel service to the community at the earliest possible time after the cessation of hostilities.

Post-War Development

The post-war development of gas manufacture is largely dependent on the relative cost of coal and oil at that time. Since the outbreak of war the price of gas oil has risen from 2½d. to 10d. per gallon, and is likely to increase further. This, coupled with the high price of coke, makes the manufacture of water gas very costly. In the past it has been our policy to manufacture a considerable percentage of carburetted water gas. If, however, the cost of gas oil remains at anything like its present figure, it is almost certain that this policy will have to be modified, and it is at present anticipated that it will be most economical to manufacture blue water gas only in sufficient quantities to dilute the coal gas to the declared calorific value. The continuance of this policy will be determined by the demand for coke.

Should the manufacture of water gas be considerably reduced, the gasholder capacity of my Company would have to be almost doubled to provide adequate storage, while the coal gas plant would have to be increased further. Both these would involve the expenditure of a large amount of capital, and it is evident that if gas is to be manufactured at a competitive price, this problem will have to be given careful consideration as soon as it is possible to estimate what the post-war conditions will be.

In conclusion, may I be permitted to appeal to all members of our Association who are members of The Institution of Gas Engineers and who are not now subscribing to the Benevolent Fund of the Institution to join in at once and help to alleviate the hardships of their less fortunate brethren. Mr. T. Reynolds, one of our Past-Presidents, is a member of the Benevolent Fund Committee, and will be pleased to supply all particulars.

ASSOCIATION OF TAR DISTILLERS—continued from p. 429.

phenol and other refined fractions thereof was developed very considerably during the year, in response to the pressing demand, through the Controller, for the utmost effort in finding material of first importance to the plastics and other war industries. The export of cresylic acid and notably the U.S.A. requirements constituted a problem of increasing importance during the latter part of the year, and as the result steps were taken to examine the possibilities of a joint scheme with the merchant exporters for the proper co-ordination of the business in the event of circumstances unavoidably demanding such a system.

(d) *Toluene.*—The Toluene Sub-committee, strengthened by additional representation of coke-oven interests, investigated again during the year under review the costs of production of nitration toluene and 90's toluole.

Labour

Certain aspects of the labour situation continued to engage the attention of the Association, but apart from the normal developments arising from legislation introduced prior to the year under review it is only necessary to mention that, in particular, special efforts were made to assist tar distillers in the consideration of the problem of employing women in the industry. A memorandum on the subject was prepared and issued with the support of the Chairman of the Chemical Control Board and, while this aspect of the labour problem has not been intimately discussed at subsequent meetings of the Association, it is known that the memorandum has in fact been of considerable help to members, and that in many cases the employment of women has been introduced or extended with a useful balance of advantage.

The Association's interest in the activities of the B.S.I. during the year under review have centred round the preparation of specifications for tar products used in substitution for asphaltic bituminous products. Specifications for pitch mastics for flooring and damp courses, and for black paint (tar base) for use on iron and steel, were issued during the year, and other specifications are in course of preparation. The B.S.I. activities, on behalf of the Burleigh Committee, for the utmost economy in the use of containers (and, so far as the tar distilling industry is concerned, metal containers in particular), have been carefully watched by the Association's representatives and by the office, and members have been given opportunities for guiding their representatives on the B.S.I. committees dealing with this work.

The Association has given extensive consideration to the question of the general level of prices of coal tar products in relation to the increased costs bearing on the industry as a whole. These deliberations necessarily had first regard to the Controller's price structure. The Executive Committee elected a small sub-committee to investigate and report on the possibilities of establishing a basis on which proper prices for tar products could be automatically determined from changes in the principal cost factors.

Future Policy

Arising from the President's inaugural address, investigations were made first on a regional basis (by personal visits by the President), and then by discussions at meetings of the regional chairman and the personnel of the Executive Committee, with a view to developing consideration of the question of the industry's organization to face the more distant future. By the end of the year it was envisaged that a statement would be presented to all members of the Association at an early date.

An "Art for the People" exhibition is being held in the showrooms of the Rochester, Chatham and Gillingham Gas Company.

The Next Meeting of the Fuel Luncheon Club will take place at the Connaught Rooms, W.C. 2, on April 16, when an Address on "Coal and Oil—A Survey of New Facts and Future Problems" will be given by Lt.-Col. W. A. Bristow.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

K for Kitty . . . —

K for Kitty—Mother's name—
R for Robert
There they go,
airborne over the dear old fields of England . . .
now dim in the dusk—out over the North Sea
a restless darkness beneath.
Towards the enemy . . .
Weather worsens—thick cloud, rain like a wall.
Lightning—on to Germany . . . and the target.
Here we are . . . Searchlights swinging,
flak, tracer—it's thick ;
First run over the target. Back over.
Here we go.
Bombs gone ! Fires . . . explosions.
We're hitting 'em—hard.
Now for home. Look out—Night Fighter !
Watch. Here he is.
B-r-r-r-r-r . . . *Got him !*

* * *

Intercom. smashed, hole in the port wing.
Black North Sea below.
Losing height . . . There are the landing flares !
R for Robert
K for Kitty
Home !

* * *

If only we realised what we owe to these men who go out on perilous journeys—for us. We praise them. Is that enough? We make munitions for them. Is that enough? We save. What of it? However much we lend, we'll never pay all they give . . . But we can at least try . . . Are you sure that you are saving ENOUGH ?

. . . — Wings for Victory

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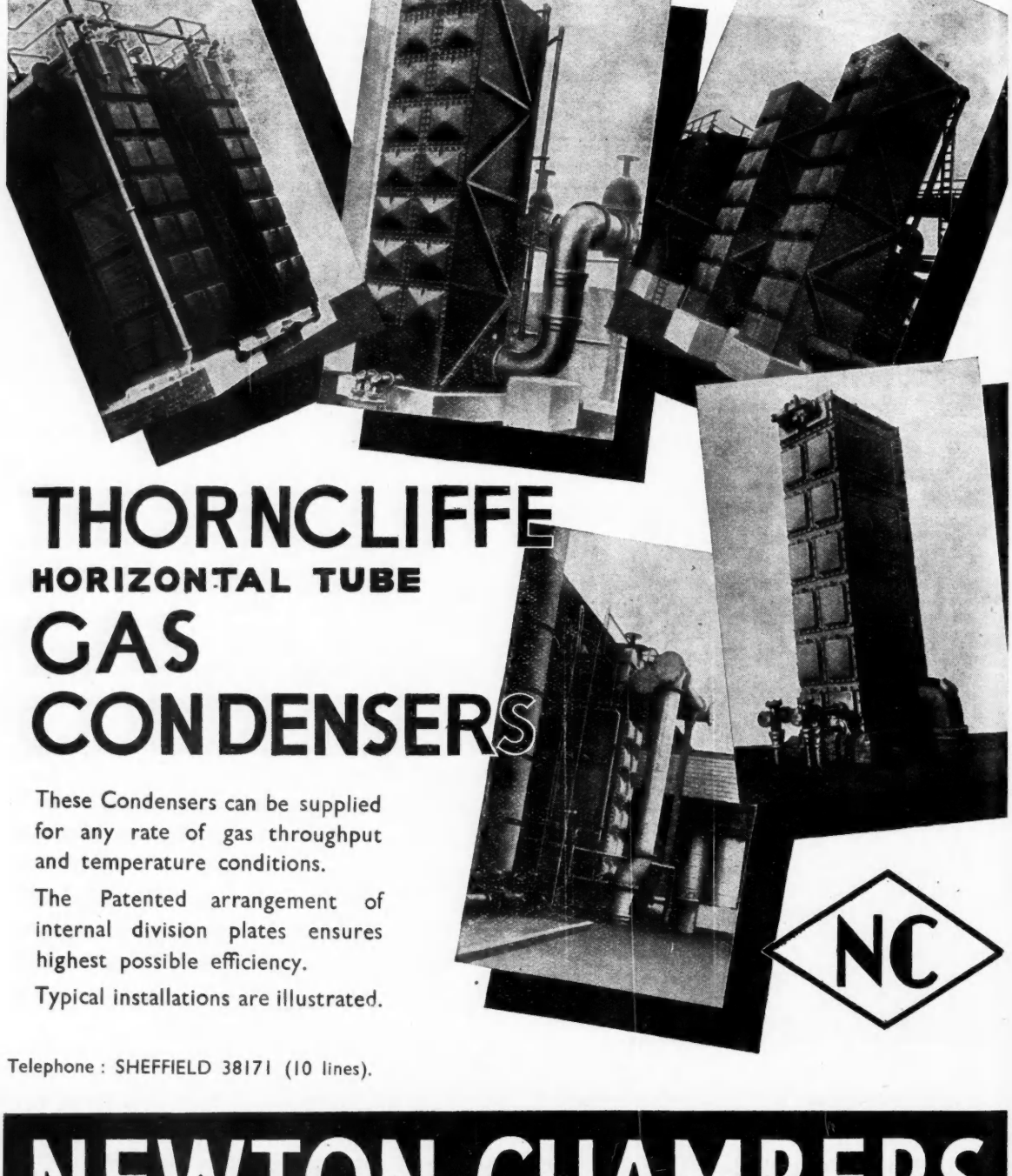

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THE BEVERIDGE REPORT*

WITH SPECIAL REFERENCE TO PENSIONS AND WORKMEN'S COMPENSATION

By HENRY LESSER, O.B.E., LL.B.

IN June, 1941, the Government appointed an Inter-Departmental Committee "to undertake with special reference to the inter-relation of the schemes, a survey of the existing national schemes of social insurance and allied services, including workmen's compensation, and to make recommendations." The Chairman was Sir William Beveridge, whose eminent qualifications as economist and administrator are beyond question. That Committee laboured, but only its Chairman brought forth a Report. He alone is responsible for it. Nevertheless, his Report is a State document of the highest importance. It is bold, broad based, and revolutionary in conception—a masterly effort to give form and substance to a great social ideal—freedom from want for everyone, man, woman and child. With that object few persons in this country to-day would disagree. It offers at least to the common man the positive hope of better things to come after the weariness, the suffering and the sacrifices of war. Small wonder, therefore, that the Beveridge scheme has so stirred the popular imagination that criticism is tolerated by many people only with impatience. That, I think, is unfortunate, for it would appear from a careful study of the Report that many of the changes suggested involve not merely a revolution of the social insurance services, but in no small measure a social revolution of another order altogether. That, of course, may not be as serious as it sounds, for British revolutions are rarely catastrophic. But in a democratic country like ours it is better that reforms so sweeping should not be rushed, and that the people should have time to discuss and understand them before passing judgment. So far such doubt or dissension as there is goes rather to ways and means than to the fundamental aim of achieving social security for all, and let it be said at once that from the point of view of cost no price within our capacity should be too much to pay for a healthy, industrious, loyal and united people. It is fitting, therefore, to pay grateful acknowledgment to the great public servant who has given us this blue-print of post-war social reform, even though one may not feel able without further enlightenment to support his recommendations in their entirety.

You, as members of this important Association, practical men engaged in industrial management, are probably less concerned, for the moment, with the wider social and economic implications of the Report than with certain specific proposals in the scheme of benefits, and their possible repercussions on existing arrangements in your own particular undertakings. With such proposals I will deal later. But as citizens and taxpayers you cannot fail, I imagine, to be interested to some extent in the general scope and character of the Beveridge Plan and its underlying principles.

Gentlemen, it has been well said that it is one thing to put a case in a nutshell, it is another thing to keep it there. So with the Beveridge plan. The range of services which it covers is so vast and complex that it is not easy even for one familiar with its background to see the wood for the trees, so to speak, and my difficulty to-day is to compress within the narrow compass of a single Paper sufficient material to leave with you a fair, if sketchy, picture of the main features of the scheme. Time, moreover, is of the essence of this meeting, and what I have to say must be brief. Subject to this limitation the Plan in barest outline comes to this:

Sir William assumes three things:

A. A national system of children's allowances.

B. A comprehensive health and rehabilitation service for every citizen.

C. The maintenance of employment, that is, the avoidance of mass unemployment.

With these assumptions I am not for the moment concerned, though, of course, they raise issues of outstanding national importance; but it is on their realization that Sir William bases his scheme. The Government have accepted them all in principle, subject, however, to further investigation.

His proposals consist of—

1. A provisional scheme of contributions and benefits.

2. An administrative framework intended to secure unification. Sir William would carve out from the work of certain Government departments and local authorities that part which involves the payment of cash benefits or assistance allowances, and transfer the administration of these money payments to a new Government department to be called the Ministry of Social Security, with local security offices all over the country. This would involve the abolition of the approved societies. There would be one card and one stamp for a single comprehensive contribution.

For the purpose of the plan the population would fall into six classes:

I. Employees, that is persons whose normal occupation is employment under contract of service.

II. Others gainfully occupied, including employers, traders, and independent workers of all kinds.

III. Housewives—that is, married women of working age.

IV. Others of working age not gainfully occupied.

V. Below working age.

VI. Retired above working age.

Thus the scheme applies in one respect or another to everyone, and for a single flat rate contribution according to the class within which you fall you may become entitled to a bundle of different benefits. They are neatly listed in paragraph 401 of the Report, to which I must refer you for greater detail. Briefly they are unemployment benefit, disability benefit, retirement pension (after a transition period of 20 years), and training benefit all at the uniform rate of 40s. for a man and wife jointly, and 24s. for a single person. Unemployment and disability benefits would be unlimited in duration. In addition the scheme includes a marriage grant, maternity benefit, funeral grant, widow's benefit, children's allowances, and industrial pensions. The rates of these benefits are purely provisional and, as Sir William Beveridge points out, they might even be left blank, and filled in after the war in the light of economic conditions then prevailing. The underlying idea is to prevent want, and for that purpose the various benefits are intended to cover the needs of bare subsistence on the assumption of a 25% increase in the cost of living as compared with that in 1938, including an allowance of 10s. a week for rent.

But a mere recital of the list of benefits tells us very little. What really matters is the underlying policy of the scheme; how it would function in the general life of the community; its relation to the particular industrial interests for whose management we are in a greater or less degree responsible, and ultimately its influence on the moral and material welfare of our country. It is from that point of view that I propose to discuss the scheme to-day—merely giving pointers for your consideration. After all, it is really the knowledge, experience and judgment of members of such associations as this, if I may say so, that should be brought to bear on the subject if we are to get the best out of the plan that is now laid before the country.

Pensions

Now there is one matter which I know is exercising your minds probably above all others, and that is pensions. Some of you have been kind enough, in response to your President's invitation, to send copies of your own private schemes. Let me then deal with pensions first.

In considering the Beveridge proposals it is important to appreciate Sir William's point of view, which is of special interest to industrial managers in respect of future labour supply quite apart from any question of pensions. Under the existing arrangements the State pension of 10s. a week is payable as of right to men on attaining age 65 and to women age 60, with supplementary pensions and allowances subject to a needs test. But Sir William is much disturbed by the serious and progressive increase in the proportion of older people to younger since the beginning of the present century, and points out that according to the White Paper on Current Trends of Population in Great Britain we are faced with a prospective population of 9½ millions of people of pensionable age in 1971 (*i.e.*, over 20% of the total) as compared with only 2¼ millions in 1901 (which was only 6.2% of the total). In these circumstances, he says, to give full subsistence income to every citizen on attaining a certain age irrespective of whether he was earning wages or not, would impose "an unjustifiable and harmful burden on all citizens below that age." On this principle, therefore, he would grant, not old age pensions as we now know them, but retirement pensions. That is to say, there would be no fixed age for retirement, but only a minimum pension age of 65 for men and 60 for women, at or after which each individual would have the option of retiring and claiming a pension. Until he did so contributions by or on behalf of him would have to be paid in the same way as for all other persons. For the majority of insured persons, the suggestion is, at the beginning of the scheme, to pay a pension of 25s. a week to a married couple, and 14s. a week to a single person, rising by 1s. 6d. and 1s. per week respectively every two years, until in 1965 the maximum is reached at the subsistence level of 40s. joint and 24s. single. Now it is obvious that at the beginning of the scheme, and for some years afterwards, 14s. for a single person and 25s. for married couples will be scarcely sufficient for them to live on. These persons must have recourse to national assistance and submit to a needs test. But Sir William, for the reasons I have mentioned, says that women of 60 and men of 65 should not retire, but should go on working if they can. The encouragement he offers is an addition to the basic pension of 2s. a week joint or 1s. single for each year of postponement subject to a time limit to be fixed by regulations. But, you may ask, how about people who are entitled to pensions through voluntary funds? This is what Sir William says:

"There are other superannuation schemes for some of which pension can be drawn only on retirement which may be earlier or later, according to the choice of the individual; provision of

* Paper to the Southern Association of Gas Engineers and Managers, March 26.

> universal unconditional pensions by the State may lead many people to take this with their other superannuation provision and retire." (Para. 245.)

That you see he is rather afraid of, and therefore makes it a condition that such persons must give up work altogether if they want the State pension.

I should explain that existing pensioners will continue to get their pensions of 10s. a week even if they do not retire from work.

Some salaried officials to-day would fall into the new class of persons not hitherto insured for State pensions. They would have to pay contributions under the Beveridge scheme for a qualifying period of 10 years. Those already age 55 or over would be allowed to claim exemption from that part of the contribution payable in respect of pensions.

That briefly appears to be Sir William Beveridge's suggestion for a post-war pension scheme. He is apparently a little troubled about it himself, because he says in paragraph 249 that "it may be argued that it is unreasonable to require retirement as a condition of pension unless and until the pension is adequate for subsistence. . . . This might be so if the object in view was to encourage retirement. That, however, is not the policy underlying these proposals." Sir William does not accept the principle of old age as giving the title to pension. This, I doubt not, is sound economics, but I venture to make this comment. In his laudable and reasonable desire to keep people at work, does he have sufficient regard to the human element in industry? Does he realize, for instance, how natural it is for the average workman at least to look forward to a period of rest from his labours, free from financial worry, free from the discipline and restraints of service even with the best of employers, and free to be his own master in the few years that may remain to him before the normal span of life is run? What, a man may well ask, is the value of freedom from want if it does not give him this freedom in his declining years? That at least is an argument with which private employers are familiar and sympathetic, as witness the rapid growth of industrial pension schemes in recent years; in fact, Beveridge relies on such voluntary effort to make good any deficiency in the provision made by the State; for he says, "in establishing a national minimum it should leave room and encouragement for voluntary action by each individual to provide more than that minimum for himself and his family," though paradoxically enough in the case of pensions such provision might encourage retirement at the minimum pensionable age rather than avoid it. However that may be, it will be interesting now to consider the position of voluntary funds.

Sir William says that the transition period of 20 years which he proposes would give time for the great variety of pension schemes now in existence to be adjusted if necessary to the establishment of universal subsistence pensions for all citizens. Now it is clear, I think, that the question of modifying existing pension arrangements must depend on conditions relating to each individual scheme. Some pension funds, for instance, provide for contributions and benefits to be paid as a percentage of salary or wages; others are at a flat rate in both cases; while some funds are non-contributory. The point will arise as to whether the employee can afford to continue his voluntary contribution to a private fund in addition to the increased State contribution. And similar considerations will affect employers. It should be remembered also that both employers and insured persons have additional liabilities to meet as taxpayers in respect of the very substantial State contribution to the scheme.

Again provision of the new high rate of State pension might disturb the existing relationship in individual schemes between remuneration and pension rates. Much would depend, of course, on the level of wages and prices. These matters can only be settled in the light of actual conditions after the war.

There is a further point arising out of the grant of the State pension only on retirement from work. As a rule pensions under private schemes are payable on retirement from the service of the particular undertaking to which the Fund applies. In future, however, it may well become necessary to decide whether or not there should be the further condition that such voluntary pensions would only be payable if the employee qualified for the State pension by giving up work altogether, subject perhaps to minor casual or part-time employment.

Another complication is the fact that some schemes in industry now provide for the payment of pension at a lower retiring age than under the State scheme. In such cases it might be necessary to pay a certain rate of pension up to age 65 (60 in the case of women), and then reduce it when the pensioner became entitled to the State pension.

And here is a point for secretaries. Most pension funds, of course, build up reserves to meet accruing liabilities in respect of pensions. Now if the pension rates are reduced because of the increased Government pension, part of these reserves might not be required, and the question would arise as to what is to be done with them. Some equitable allocation would have to be made as between the contributing parties—employer and employed—or by consent they might be applied to any other purposes of the fund. I only mention this in passing, as it is really a matter on which the actuary should be consulted.

One final point. In some pension funds provision is already made under the rules or the Trust Deed for the modification of the rates of contribution and pension in the event of any increase in the State pension. In many others, however, there is no such provision. In such cases I should think there would be little doubt that the Government would follow the precedent set in the Contributory Pensions Act of 1925, giving authority to the Chief Registrar of Friendly Societies to confer on the persons responsible for the management of the fund the powers necessary for the purpose.

In the recent debate in the House of Commons it was said that the Government could not agree to the Beveridge proposals in regard to the transition period or the payment of Contributory State pensions at the subsistence level. Sir John Anderson made it clear that the Government preferred a different approach, and would fix a definite rate of pension and contribution even if the initial rate was somewhat higher than that recommended under the Beveridge scheme. On the other hand, the principle was accepted that the payment of "old age pensions" should in future be contingent upon retirement from work. There, for the moment, the matter rests. We must now await the draft legislation which the Government have promised to submit to Parliament; but that does not mean that we have heard the last of the Beveridge proposals in the matter of pensions.

(To be continued)

W.G. Plant and Producers

A patent (No. 550,770; application date, March 25, 1942) taken out by Humphreys & Glasgow, Ltd., and J. H. Smith relates to a water gas generator or producer having a cooled wall surrounding part of the fuel bed, the wall being provided with an adherent or closely attached lining or coating of substantially inert or unreactive carbon adapted to permit such heat transmission through the wall to the cooling medium that the temperature at its surface adjoining the fire will be such that it cannot enter into chemical reaction with the gases in the generator or producer, but will retard heat transmission sufficiently to leave the contiguous areas of the fire in an active state for gasmaking. The fire side face of the unreactive carbon lining would have to attain a high temperature before being acted upon by the air, steam, or gas, and, being low in ash content, fluxing with the clinker and destruction of the coating or adhesion of clinker thereto is thus avoided.

In one method of lining the inner metal wall of an annular boiler, powdered retort carbon intimately mixed with a suitable binding material, such as pitch, bitumen, dehydrated tar, or colloidal carbon, is forced under pressure and in an adhesive state against the wall of the water-cooled jacket and the binding material thereafter carbonized. The quantity of binding material used is so regulated that, when it is subsequently carbonized, it binds the original particles of retort carbon together and to the wall, and a dense and unreactive carbon lining is produced. The carbon formed from the small quantity of binding material by carbonization is virtually ash free.

Alternatively, the wall may be wetted with the binding material and the powdered retort carbon blown in the dry state on to the wetted wall, subsequent carbonization of the binding material cementing the powdered retort carbon into a dense and unreactive lining. In either method the carbon may be put on in several layers, each layer being carbonized separately, or the thickness may be such that combustion of the surface takes place, which results in the layer nearer the wall being carbonized at a higher temperature to a denser and more inert carbon.

If too thick a lining or coating were initially applied and the inner face, by being separated from the cooled wall by too great a thickness of carbon, reached a temperature at which it reacted with the air, steam, or gas it would thereby be reduced in thickness until a layer resulted of such a thickness that the transmission of heat to the cooled metal was sufficiently fast to cool the fire side face to a temperature at which reaction ceased.

Another method of applying the lining or coating is by the direct deposition upon the wall of carbon resulting from the cracking of gaseous, vaporized or liquid hydrocarbons. In another method graphite, or other unreactive form of carbon, may be suspended in a volatile solvent and the suspension or colloidal solution of carbon so formed painted on the wall in successive layers. Preformed dense and unreactive carbon tiles or bricks may alternatively be used to construct the carbon lining or coating of a cooled jacket, the tiles or bricks being suitably keyed and cemented to the metal by means of a mastic, such as dehydrated tar, pitch, or bitumen mixed with powdered retort or other suitable form of carbon, subsequent carbonization forming a solid adherent or closely attached lining or coating.

The Members of the North-Eastern Commercial Section of the North British Association of Gas Managers held their bi-monthly meeting in Kirkcaldy on March 26. The members combined their meeting with a visit to the works of the local Gas Undertaking, and were later entertained at tea by the Gas Committee. Treasurer A. G. Adamson, Convener, welcomed the visitors to the works, and expressed the hope that they would find their visit both instructive and encouraging. Mr. W. Nicol Baird (Perth), Chairman, replied on behalf of the Association, thanking Treasurer Adamson for the excellent arrangements made for their reception, and assuring him that the inclusion of Kirkcaldy as a centre for future meetings would not be overlooked. Mr. R. M. Simpson, President of the North British Association of Gas Managers, also spoke, and congratulated the Undertaking on the excellent condition of the works and on the high standard of efficiency that was obviously being maintained in the Undertaking.

Gas Products Prices

The London Market April 5.

All Coal Tar Products are in good demand, and Pitch in the London area remains about 45s.

The Provinces April 5.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Naphtha and Xylol controlled by the Coal Tar, Naphtha, and Xylol Order, 1942, dated Dec. 7, 1942, and operative from Dec. 21. Carbolic acid, 60's, naphthalene, and anthracene controlled by the Coal Tar Products Prices Order S. R. & O. 2509, dated Dec. 7, 1942, and operative from Jan. 1, 1943. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5¼d.; timber preservation and other purposes 4¾d. to 6d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland April 3.

Deliveries are substantial with prices unchanged. Refined tar controlled. Value is 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6½d. to 7d.; low gravity, 7¼d. to 7½d.; neutral oil, 6d. to 6½d.; hydrogenation oil, 5⅞d. per gallon; all *ex* Works in bulk. Refined cresylic acid is moving in fair quantities at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha: 6½d. to 7d. per gallon. Solvent naphtha: Basic prices delivered in bulk, 90/160 grade 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 3d. per gallon. Pyridine: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

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GAS STOCKS AND SHARES

Only for a short time during last week was business stimulated by the news from Tunisia, and markets, with few exceptions, were quiet and irregular. British Funds were brighter and Rand gold and diamond shares continued the chief features. There was not so much business in the Gas Market but all prices were maintained and, as will be seen in the list, there were a few upward movements—preference issues again making the best showing. As usual in the first week of the month the full lists of current prices are shown below, and compared with the quotations of a month ago the values of over fifty issues have been marked up. A fairly representative list of preference and debenture stocks are on offer and among the former is £5,000 of South Metropolitan 6% at 131 yielding £4 11s. 6d.%, and £2,400 Wandsworth 4% at 94 to give a return of 4¼%.

The following quotations were changed last week:

OFFICIAL LIST

Alliance & Dublin Ord.	87—92	+5
British Gas Light Ord.	97—102	+2
South-Eastern Gas Corporation 4 p.c. Cum. Pref.	17/—19/-	+1/-
South Suburban 5 p.c. Pref.	105—110	+2
Tottenham 5 p.c. Pref.	105—110	+5
Ditto 4 p.c. Deb.	100—105	+3
United Kingdom Gas Corporation 4½ p.c. 1st Cum. Pref.	19/—20/-	+-/6d.
Ditto 4½ p.c. 2nd Non-Cum. Pref.	17/—19/-	+1/6d.
Wandsworth 4 p.c. Pref.	90—95	+1

PROVINCIAL EXCHANGES

Bristol 5 p.c. max.	111—113	+½
Derby Cons.	122—127	+7

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 1
1,767,439	Sept. 7	5	5	Alliance & Dublin Ord.	87—92
374 000	Dec. 28	4	4	Do. 4 p.c. Deb.	95—100
583,407	Nov. 9	5	5	Assed. Gas & Water U'd'ts Ord.	19/—20/-
388,938	"	—	—	Do. Deferred	19-/—20/-
500.000	"	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—20/-
535,545	"	4	4	Do. 4 p.c. Red. Cum Pref.	19/—20/-
341,966	"	4	4	Do. 4 p.c. Irred. Cum. Pref.	17/—18/-
561,370	Feb. 22	7	7	Barnet Ord. 7 p.c.	145—150
300,000	Oct. 5	1/9⅜	1/4⅜	Bombay, Ltd.	21/6—22/6
690,407	Feb. 15	7	7	Bournemouth 7 p.c.max	137—142
362,025	Dec. 14	4	4	Do. 4 p.c. Deb.	102—107
659,955	March 15	2½	2½	Brighton, &c., 5 p.c. Con.	80- 85
855,000	"	6	6	Brit. Gas Light Ord.	97—102
545,000	Dec. 21	5½	5½	Do. 5½ p.c. 'B' Cum Pref.	110—115
120,000	" 14	4	4	Do. 4 p.c. Red. Deb.	92—97
10,000	Nov. 6 '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	40/—60/-
626,860	Feb. 8	6	6	Cardiff Con. Ord.	102—107
24,500	Oct. 26	7	7	Colombo 7 p.c Pref.	21/—23/-
764,169	March 22	-/9.56	-/9.56	Colonial Gas Assn. Ltd. Ord.	½—¾
400,000	"	1/3.298	1/3.298	Do 8 p.c. Pref.	⅞—1
1,748,090	July 22 '40	2	3	Commercial Ord.	56—61
620,000	Dec. 7	3	3	Do. 3 p.c. Deb.	60—65
286,344	Feb. 15	5	5	Do. 5 p.c. Deb.	105—110
807,560	" 22	6	6	Croydon sliding scale	115—120
644,590	"	5	5	Do. max. div.	91—96
620,385	Dec. 28	5	5	Do. 5 p.c. Perp. Deb.	122—127
179,500	Feb. 22	5	5	East Surrey 'B,' 5 p.c.	85—90
176,461	Dec. 28	5	5	Do. 5 p.c. Deb. (Irred.)	122—127
250,000	Nov. 9	6	4	Gas Consolidation Ord. 'B'	16/6—18/6
250,000	"	4	4	Do. 4 p.c. Red. Cum. Pref.	18/—20/-
19,107,811	Feb. 15	—	†1	Gas Light & Coke Ord.	16/—17/-a
2,600,000	"	—	†1½	Do. 3½ p.c. max.	66—69
4,477,106	"	4	4	Do. 4 p.c. Con. Pref.	90—95
2,993,000	"	3½	3½	Do. 3½ p.c. Red. Pref.	90—95
8,602,497	Nov 30	3	3	Do. 3 p.c. Con. Deb.	86—89
3,642,770	"	5	5	Do. 5 p.c. Red. Deb.	106—110
3,500,000	"	4½	4½	Do. 4½ p.c. Red. Deb.	105—109
700,000	March 8	3½	3½	Do. 3½ Red. Deb.	95—98
5,600,000	May 13 '40	4	8	Imperial Continental Cap.	77—82
43,820	Jan. 25	3½	3½	Do. 3½ p.c. Red. Deb.	95—100
231,978	Feb. 22	5	5	M.S. Utility 'C' Cons.	85—90
918,657	"	4	4	4 p.c. Cons. Pref.	87—92
675,000	Nov. 16	‡4	‡4	Montevideo, Ltd.	95—100
300,000	Dec. 14	7	9	Oriental, Ltd.	97—102
368,537	June 15	3½	2½†	Plymouth & Stonehouse 5 p.c.	77—82
621,667	Feb. 8	7½	7½	Portsmouth & Gosport Cons.	105—110
2,381,363	May 18	—	4†	Primitiva Holdings, Ltd. Ord.	12/—14/-
233,900	Dec. 14	3½	3½	Do. 6½ p.c. Red. Cum. Pref.	96—101
648,999	Sept. 7	1/1⅛	1/1⅛	Severn Val. Gas Cor. Ld. Ord.	18/6—20/6
597,972	March 8	4½	4½	Do. 4½ p.c. Cum. Pref.	17/6—19/6
2,528,714	Aug. 24	1/-	7½	South East'n Gas Cn. Ld. Ord.	17/9—18/9
1,000,000	March 1	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	18/0—20/-
1,068,869	"	4	4	Do 4 p.c. Irred. Cum. Pref.	17/—19/-
6,709,895	Feb. 22	—	†1	South Met. Ord.	73—76
1,135,812	"	—	†6	Do. 6 p.c. Irred. Pref.	126—131
850,000	"	—	†4	Do. 4 p.c. Irred. Pref.	89—94
1,895,445	Dec. 28	3	3	Do. 3 p.c. Perp. Deb.	82—87
1,000,000	Jan. 11	5	5	Do. 5 p.c. Red. Deb.	103—108
1.543,795	Feb. 8	4	4	South Suburban Ord. 5 p.c	95—100
$12,825	"	5	5	Do. 5 p.c. Perp. Pref.	105—110
$00,000	"	4	4	Do. 4 p.c. Perp. Pref.	85—90
250,000	"	3½	3½	Do. 3½ p.c. Red. Pref.	90—95
888,587	Dec. 14	3	5	Do. 5 p.c. Perp. Deb.	122—127
750,541	Feb. 8	2	6	Southampton Ord.	78—83
350,000	" 15	5½	5½	Swansea 5½ p.c. Red. Pref.	95—100
1,076,495	March 1	5	5	Tottenham & District Ord.	100—105
338,555	"	5	5	Do. 5 p.c. Pref.	105—110
453,380	Dec. 7	4	4	Do. 4 p.c. Perp. Deb.	100—105
1,247,505	Nov. 9	6	4	U. Kingdom Gas Cor. Ord.	19/—20/-
1,085,952	Nov. 16	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	18/6—20/6
772,709	"	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	18/6—20/6
745,263	Dec. 14	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	17/—19/-
1,200,000	March 15	3½	3½	Do. 3½ p.c. Red. Deb.	95—100
380,606	Aug. 24	6⅜	6⅜	Uxbridge, &c., 5 p.c.	113—118
1,371,138	Jan. 25	4	6	Wandsworth Consolidated	102—107
2,525,768	"	4	4	Do. 4 p.c. Pref.	90—95
1,343,964	Dec. 14	5	5	Do. 5 p.c. Deb.	122—127
383,745	"	4	4	Do. 4 p.c. Deb.	95—100
558,342	Feb. 22	5	5	Watford & St. Albans Ord.	108—113
300,000	Dec. 7	3½	3½	Do. 3½ p.c. Red. Deb.	90—95

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 1
351,685	Dec. 14	5	5	Brighton, &c., 5 p.c. Perp. Deb	117—122
415,250	"	4	4	Bristol Gas Co., 4 p.c. New Deb.	100—105
140,205	Feb. 15	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	132—137
295,932	March 8	5	5	Cheltenham, 5 p.c. Cons. Ord....	95—100
42,500	Dec. 14	4	4	Do. 4 p.c. Perp. Deb....	95—100
150,000	Feb. 22	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	85—90
130,000	Dec. 28	4	4	Do. 4 p.c. Deb.	97—102
146,700	Feb. 22	5½	5½	East Surrey, 5½ p.c. Pref. 'A'	95—100
53,220	"	9	6	Do. 6 p.c. Cum. Pref.	115—120
	Aug. 19'40	6	4	Eastbourne, 'B' 3½ p.c....	42—47
117,425	Feb. 5 '40	8	8	East Wight Cons. 5 p.c.	65—70
239,135	Nov. 9	5	5	Gas Consolidation 'A' Ord. (£1)	15-/—17/-
156,600	Feb. 15	5	5	Hampton C't, 5 p.c. Cons. Ord.	95—100
18,000	Dec. 29'41	3½	3½	Malta & Med'n., 7 p.c. 1st Pref.	30—40
10,845	June 30'41	3½	3½	Do. 7½ p.c. 2nd Pref.	30—40
50,000	Feb. 22	£5 4 6	£5 4 6	Mid. South. Util., 'A' Cons. 5 p.c.	80—85
65,000	"	5	5	North Middlesex, 5 p.c. Pref.	95—100
70,000	March 15	5	5	Plymouth & Stone., 5 p.c. Deb	110—115
76,501	Dec. 21	4	4	Reading, 4 p.c. Perp. Deb.	95—100
74,777	March 31	4	4	Romford, 4 p.c. Debs. (Reg.)	95—100
21,000	Dec. 7	5	5	Slough, 5 p.c. Perp. Deb.	120—125
211,740	" 14	5	5	Southampton, 5 p.c. Red. Deb.	103—108
363,575	Jan. 4	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	99—102
202,019	Aug. 24	7½	7½	Tunbridge Wells, 4 p.c. Scale	119—124
135,257	Dec. 7	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	122—127

PROVINCIAL EXCHANGES

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Mar. 26.
804,948	March 1	5	5	Bath Cons.	100—103
122,577	" 8	5	7	Blyth 5 p.c Ord.	108—110
1,667,250	Feb. 15	5	5	Bristol, 5 p.c. max.	111—113
120,420	Dec. 14	4	4	Do. 1st 4 p.c. Deb.	101½—103½
415,250	"	4	4	Do. 2nd 4 p.c. Deb.	100½—102½
328,790	"	5	5	Do. 5 p.c. Deb.	112—117
157,150	Feb. 1	5	6½	Chester 5 p.c. Ord.	98—102
92,500	Dec. 14	4	4	Do. 4 p.c. Pref.	79—81
36,430	"	3½	3½	Do. 3½ p.c. Deb.	78—82
41,890	"	4	4	Do. 4 p.c. Red. Deb.	98—100
542,270	Feb. 8	9	6	Derby Cons.	122—127
55,000	Dec. 14	4	4	Do. 4 p.c. Deb.	95—100
10,000	Feb. 22	10	10	Great Grimsby 'A' Ord.	155—165
6,500	"	10	10	Do. 'B' Ord.	155—165
79,000	"	10	10	Do. 'C' Ord.	145—155
732,000	Feb. 15	4	4	Hartlepool G. & W. Cn. & New	84—86
2,167,410	" 22	5	5	Liverpool 5 p.c. Ord.	103⅜—104½
245,500	Dec. 21	5	5	Do. 5 p.c. Red. Pref.	100—104
306,083	July 15	4	4	Do. 4 p.c. Deb.	100—102
20,000	June 22	5	5	Long Eaton 5 p.c. Pref.	9—11
80,000	"	5	5	Do. 5 p.c. Deb.	95—100
2,430,267	Feb. 8	5½	5½	Newcastle and Gateshead Con.	22/6—23/-
682,856	"	4	4	Do. 4 p.c. Pref.	93½—94½
776,706	Dec. 28	3½	3½	Do. 3½ p.c. Deb.	95½—96½
277,285	Nov. 2	5	5	Do. 5 p.c. Deb. '43	99—101
13,200	Sept. 16	8⅝	7	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½
13,600	"	6	5	Do. 7 p.c. 'B'	9½—10½
40,000	"	5	6	Do. 7 p.c. 'C'	9½—10½
106,280	Feb. 8	10	10	Preston 'A' 10 p.c.	150—160
188,219	"	7	7	Do. 'B' 7 p.c.	109—119
1,806,339	" 22	6½	6½	Sheffield Cons.	129—132
95,000	Jan. 4	4	4	Do. 4 p.c. Deb.	98—100
332.351	Feb. 22	6	6	Sunderland 6 p.c. max.	114—116
192,150	" 8	5	5	Weston-super-Mare Cons.	99—101
64,338	Jan. 4	4	4	Do. 4 p.c. Deb.	99—101
33,340	"	7½	7½	Do. 7½ p.c. Deb.	142—147

a—The quotation is per £1 of Stock. * Ex. div † For year. ‡ Paid free of income-tax.

GAS JOURNAL, APRIL 14, 1943

VOL. 241 95th YEAR No. 4169

EDITORIAL NOTES

THE GAS RESEARCH BOARD

ON Friday last the curtain concerning the activities of the Gas Research Board was well and truly lifted by Mr. E. V. Evans, President of the Institution and Chairman of the Board, in an Address of first moment to the North British Association of Gas Managers; and we think that the developments which have taken place swiftly during recent months and even weeks will be hailed with general satisfaction coupled with a sense of relief by the Gas Industry. The cold-storage policy has been replaced by vigorous action which appears to us to augur well. The story is unfolded clearly by Mr. Evans on later pages, and there is no need for us to repeat it here. We think that the organization has been planned with vision in a somewhat difficult jig-saw, that definition has been given—and none too soon—of the fields of work of the State-aided fuel research associations, of which the Gas Research Board is now one, and that the means for effective co-operation between them all has been admirably thought out and established. To our mind one of the happiest features is the setting-up of a Co-ordinating Committee of the fuel research associations, including, of course, the Fuel Research Board, under the Chairmanship of Sir Harold Hartley—surely a wise step. Again, we can only regard the choice of Dr. J. G. King as Director of the Gas Research Board as a happy one. Well known to the Gas Industry, the technical literature of which he has enriched, Dr. King has long and intimate knowledge of the art and practice of a Government research body, and his team-work experience will no doubt prove invaluable. We feel sure the Industry will wish him well in his new task. And we regard the strengthening of the Council of the Board by the nominations of Sir Lawrence Bragg, Professor C. G. Douglas, and Mr. R. O'F. Oakley as being both important and fortunate. When the organization, with its joint assistant directors (the appointment of Dr. F. J. Dent was announced in the "JOURNAL" last week), gets completely to work, our Industry will be justified in expecting from it much help and guidance.

But Mr. Evans was at pains to ask us not to overestimate the part the Gas Research Board can play in the development of the Industry. The Gas Industry must be prepared to interpret and apply its work. And we would underline Mr. Evans's plea that gas undertakings and the manufacturers of plant and appliances—who, in the immediate pre-war years were spending annually £400,000 on research—should not regard the establishment of the Board on its new basis as excuse for any slackening of individual effort in the investigation of day-to-day problems. With these provisos, however, the path seems to us to be better paved towards closer co-operation generally and towards accelerated progress in anticipation of post-war needs.

A COKE AND GAS INDUSTRY

THE Liverpool Gas Company has to such good effect paid attention to the preparation of coke—its work in this connexion for several years prior to the war is well known—that we were not at all surprised that Mr. W. Fletcher, in his Presidential Address to the Manchester District Association, should prophesy that the Gas Industry's solid smokeless fuel may become of importance equal to if not greater than that of gas itself in a properly devised national fuel policy. Liverpool knows from experience that expenditure of time, energy, and money on the upgrading of coke is a paying proposition; and it is obviously in the national interest. There are, of course, two methods of attack on the problem—the one the supply of a relatively incombustible fuel for use in appliances specifically designed for it; the other the supply of a combustible fuel which will burn satisfactorily and smokelessly in the ordinary open grate. Mr. Fletcher spoke enthusiastically of the latter alternative, basing his comments and opinion on Liverpool's success with "Dryco," the mounting sales of which pre-war were proof sufficient of the demand for such a fuel. On the other hand, we think he showed undue pessimism in regard to the former alternative. We foresee after the war improved coke-burning appliances which will meet with popularity—that is, of course, assuming that we market a graded product of uniform quality, determined in the first instance by the supply to the Industry of suitable coal, a matter which must claim attention in any reasonable national fuel policy. In any case, accompanying the supply of a graded coke we have the production of breeze, disposal of which Mr. Fletcher views with concern. We must, he said, see that a steady market for it is developed, with which we agree, but we do not share his concern. Surely the Gas Industry itself has a major market for breeze. We discussed this in the "JOURNAL" of Feb. 3 last in relation to the design of carbonizing plant and the amount of coke used in the gas-making process, when we suggested that attempts to justify heavy coke consumption were often made on the grounds that the coke consumed is recovered as steam from the waste heat. We asked whether this could be regarded as an efficient method of turning heat into steam, adding: "If a certain production of waste heat is unavoidable, by all means turn it into steam, but do not let us go out of our way to make waste heat. If the steam produced is insufficient, raise the extra steam in independent boilers fired by coke breeze." Working along these lines would not only raise efficiency, but would go a long way at all events to solving any breeze problem.

The Address by Mr. Fletcher—we published it in full in last week's "JOURNAL"—was not by any means confined to the question of coke preparation and sales, though this theme was deservedly prominent. It surveyed many matters from what we may term the practical angle, including the advisability of further mechanization of gas-works to eliminate heavy manual labour and its attendant difficulties, which are more likely to be accentuated than reduced after the war, the possibilities which undoubtedly exist and have been strongly emphasized in recent months of fuel economy in gas production, the need for concentrating on service *via* a gas supply of unvarying characteristics, the desirability of collaboration in research with other fuel interests, and the importance of offering adequate salaries to recruit to the Industry's ranks the right type of personnel. We dealt with the salaries question in our issue of March 10 in more optimistic vein than has been possible for some time. We feel sure that considerable headway is being made, and it was appropriate that Mr. Fletcher should refer to the work which has been pursued in this direction by "a Past-President of The Institution of Gas Engineers and a member of the Manchester Association"—Sir Frederick West.

FACT FINDING AND FACING

THERE will be considerable divergence of opinion as to the proportion of the best brains in the country among those prominent in politics, but in no case would the figure be very high. We think there will be general agreement with this comment of Mr. G. S. Garland in his Presidential Address this month to the Institution of Chemical Engineers. But the general attitude of scientific men to politics has wrongly been one of indifference, coupled maybe with a feeling of superiority to those whose cherished apparatus is the golden or the strident voice, whose laboratory is the hustings, and whose raw material is the feelings and beliefs of their fellow citizens. The point remains, however, that politics decides every phase of our activities; the time for a delicate disdain of politics by men of science has long since passed. Industries must, as industries,

know facts about themselves, and be able to present these facts in an effective manner to Government departments. It seems clear that the essential first stage of the solution of post-war problems is that of finding the facts. The Ministry of Fuel and Power had demanded relevant facts from the fuel industries, including, of course, electricity. A few weeks ago, as we mentioned in our issue of March 24, it gave the Gas Industry six months to put forward proposals based on facts; we discussed in the same issue the machinery which has been established to this end.

However unpleasant the process, we must grapple with facts. Mr. Garland, as a realist, suggested that our position as regards the minerals needed in bulk by manufacturing industry is probably worse than that of any other great nation. We have acquired the habit of making the comforting assumption that the minerals found in the British Empire, added to what we have in this country, make up a sufficient percentage of the world's total resources to render us relatively independent. Yet the Empire has only some 1.8% of the world's petroleum, 5.6% of pyrites, 5.2% of sulphur, 8.3% of bauxite, and 0.5% of potash. We have in this country a certain amount of coal, but it is less than 3% of the world production. It is our most important raw material, but technical men cannot pride themselves on the way we have used the great bulk of it. We have regarded coal, not as the most important source of carbon compounds, but as a combustible for the generation of heat and power—for the most part inefficient generation. Petroleum is equally with coal a source of power or a raw material for the carbon compounds which are the basis of plastics and much chemical and synthetic manufacture. In 1938 the American petroleum industry was employing over 5,400 scientific workers. Research has been largely responsible for the growth of the industry. In our own country research on coal has been relatively insignificant in volume, and we think we are right in saying that most of it has been carried out by the Gas Industry. Facts and comparisons such as these are unpalatable but cannot be set aside.

We can, however, take comfort in the fact that our country has always been in the forefront, as regards quality, of fundamental scientific research. We have had and we still have plenty of raw material in this respect. That we have not reaped the full benefit of our own fundamental discoveries has been due to the fact—another fact—that the application of our own researches to practical needs has on several occasions been left to the technicians of other nations. To what extent this has resulted from lack of co-operation and understanding between scientist and politician we do not know, but the lack must have had a considerable bearing on the situation, and the moral seems to us obvious. Despite the fact that our coal production is less than 3% of world total, our industrial greatness has been built on the wasteful use of coal. Coal remains the principal basis of our chemical industries. But we should and must cut out the waste. We should and must treat our coal before use. Scientists should by the several means within their power influence the golden or strident voice of the politician towards this end, so that the feelings and beliefs of their fellow citizens may be sharpened and moulded accordingly to the benefit of the nation.

Tar Products

The annual report of the Association of Tar Distillers (*ante*, p. 429) makes encouraging reading, and it is good to know that the work of the Coal Tar Bituminous Products Sub-Committee has opened up many new uses in connexion with constructional work. Properly developed in actual production and treated as carrying a considerable measure of responsibility on tar distillers to produce satisfactory material and ensure the proper servicing of the market, this new field offers opportunities of a first-class and permanent nature. The Association is actively represented on the B.S.I. Committees which are preparing specifications for various tar products used as or in constructional materials. It is co-operating in carefully planned field trials in directions of use for which there is insufficient past experience. The Association's interest in the activities of the B.S.I. during the year under review have centred round the preparation of specifications for tar products used in substitution for asphaltic bituminous products. Specifications for pitch mastics for flooring and damp courses, and for black paint (tar base) for use on iron and steel, were issued during the year, and other specifications are in course of preparation.

Personal

Sir WILLIAM FAWELL ASCROFT, D.L., J.P., a Director of the Preston Gas Company, has been appointed High Sheriff of Lancashire.

* * *

Mr. JOHN BATEMAN, Works Superintendent, Lincoln Gas Department, has been appointed Superintendent of the Neepsend Works of the Sheffield Gas Company.

Mr. J. S. MARSHALL, of the Bradford Road Works, Manchester, has been appointed to fill the vacancy at Lincoln.

* * *

Mr. S. H. LAWRENCE, A.M.I.Mech.E., the newly appointed Engineer and Manager of the Ellesmere Port Gas Department, has now taken up duties. Mr. Lawrence has for the past six years held the position of Deputy Engineer to the Nelson Corporation Gas Department.

* * *

Mr. A. E. WILLIAMS, M.Inst.C.E., has been elected an additional Director of the Commercial Gas Company. Mr. Williams retains the office of Chief Engineer of the Company.

* * *

Brief reference was made in our report last week of the Manchester Association meeting to the retirement of Mr. H. BURTON, Shipley, from the Hon. Secretaryship. He has filled this position for six years with outstanding success, following the late J. Bridge, of Elland, who had set a very high standard for the office.

Mr. Burton is succeeded by Mr. THOMAS HAWORTH, Darwen, who is at present Secretary of the Lancashire Commercial Section.

* * *

The Lord President of the Council has appointed Mr. R. O'F. OAKLEY, O.B.E., to be Assistant Secretary in the Department of Scientific and Industrial Research. Mr. Oakley joined the administrative staff of the Department in 1930, after previous Government service in the Patent Office and service in the Royal Army Ordnance Corps during the 1914–18 War. He became Assistant to the Director of Fuel Research in 1938, but since 1940 his services had been lent to the Ministry of Home Security as Deputy Chief Adviser, Research and Experiments Department.

* * *

The Lord President of the Council has appointed Mr. A. PARKER, D.Sc., F.I.C., M.I.Chem.E., to be Director of Fuel Research in the Department of Scientific and Industrial Research. Dr. Parker joined the staff of the Department of Scientific and Industrial Research in 1928 as Assistant Director of Water Pollution Research. He had previously been engaged for some ten years on research for the Gas Industry, including full-scale experimental work, as Senior Research Chemist to the Joint Committee of the University of Leeds and The Institution of Gas Engineers. Since the outbreak of war he has been Acting Director of Water Pollution Research. He has served for many years on the Council of the Institution of Chemical Engineers and has been a Vice-President of the Institution.

In the Lincoln "Wings for Victory" week, £15,000 was invested in War Bonds on behalf of the Gas Undertaking.

The Industrial Gas Centres Committee will meet at Gas Industry House at 9.30 a.m. on Thursday, May 6.

The Spring Meeting of the Midland Association of Gas Engineers and Managers will be held at Wolverhampton on May 27.

A Meeting of the Manchester and District Junior Gas Association will be held on April 17 at the College of Technology, Manchester, when Mr. A. Healey, of Oldham, will read a paper on "Toluene and the Gas Industry."

A Year Ago the Leamington Priors Gas Company entered all their horse and motor-lorry drivers in the Royal Society for the Prevention of Accidents "Safe-driving Competition." All who were employed as drivers throughout the year 1942 came through with a clean record of freedom from accidents. The Society has awarded them diplomas to this effect.

The Glasgow Gas Committee has decided to adhere to the practice of charging meter rents to consumers using less than 1,000 cu.ft. per quarter, subject to a discretionary power on the part of the management. The Ministry of Fuel and Power suggested that the policy should be reconsidered with a view to discontinuing the practice for the duration of the war. Reporting on the position, the Manager of the Department emphasized that the charge was not enforced where consumption was reduced by fuel economy, and also that it was not levied in cases of hardship. He stated that the charge was imposed on consumers who had never been large users of gas and on those who were using gas as a stand-by.

Coal, Gas, Electricity

On March 25 an Address was given to the Fuel Luncheon Club by Sir John Dalton, Manager and Secretary of the County of London Electric Supply Company, but whose chief present activities are as Regional Fuel and Power Controller for London and the South-Eastern Regions. He was welcomed by Sir David Milne-Watson, President of the Club, who presided.

Sir John Dalton, in the course of his remarks, expressed the hope that with our scientific manpower and scientific ability and sufficient technical resources, we can do here for coal what they have done for oil in America. He went on to say:

"It seems there is a large number of Study Groups and Committees which are planning the future of the fuel industry for us, and I am forced to the conclusion that these various people, who may be extraordinarily good in their own special fields, have failed to grasp some of the fundamentals of fuel and power supply. They have a tendency to think of all post-war problems in terms of social science—whatever that may mean.

"Now the scope of the domestic market for heat and power accounts for some two-fifths of our consumption of coal. An enormous amount of coal and an enormous amount of revenue is involved. This revenue is effectively controlled by the types of appliance installed in houses at any given period, and the market for these appliances is very stable, as the life of them ranges from 10 to 20 years. Therefore if, as is anticipated, there may be an enormous number of new houses built after the war, the selection of services in these new houses will have a decisive influence on the trend and nature of consumption for many years thereafter.

"Therefore, my appeal is directed to the necessity of some balance between the use of coal, gas, and electricity in this domestic heating market which will be most advantageous in the national interest and most advantageous to the three industries concerned. The only way to determine such balance is for the three industries concerned to get together and arrive at a scheme to achieve such a balance, and then to get our Ministry to bless it on national and economic grounds. Look for a moment at the economics of the house coal position. It is an influencing factor on the whole problem. It comprises some 40 to 50 million tons of coal which attracts the highest prices. House coal commands pithead prices some 4s. per ton higher than the price which is paid for gas and electricity coal. This is equivalent to over £9,000,000 per annum, which is a sum greater than the whole realized surplus of the coal industry out of which all wages above the basic minimum, and profits, have to come. It seems clear, therefore, that any disturbance of any considerable proportion of the house coal trade by gas or electricity must throw more than a spanner into the economics of the coal industry. It might indeed increase the price of gas and electricity coal.

"Apart from this economic factor I think it is about time that we gas and electricity people frankly admitted that the coal fire in the house is a prejudice to which every Britisher is entitled. I think there is nothing which our gas and electricity experts have or can produce which can touch the comfort and joy of an open grate burning raw coal. The house coal consumed in open firegrates must be of the order of some 50% of the whole coal used by the domestic market in all forms for heating and power, and I am of the opinion that neither the electrical industry nor the gas industry could take over, or even divide among themselves, this large heating load from the economic point of view. It follows that the house coal trade is indispensable not only to the coal industry, but also to the gas and electric industries.

"It is a fact, speaking now only for the electricity industry, that we are embarrassed by the uncertain and fluctuating load due to space heating as the result of the cold spells during the winter. Some idea of what this snap heating load means is given when I say that overnight at the end of the very cold spell in the early part of 1942 the electrical load of the industry dropped just about 1,000,000 kW. as the result of the sudden cessation of the cold spell. I was interested during that cold spell to assess as nearly as I could the excess consumption of gas and electricity coal due to this snap heating load, and my estimate was that the gas industry required 25,000 tons per week more coal and the electricity industry required 79,000 tons a week more coal to meet this heating load. It appears obvious that if this load grows much more and gets out of hand, both the gas and electricity industries will be involved in further capital expenditure on plant to meet a peak which will only occur at very infrequent intervals. One of the fundamental points to be pressed for with building authorities in respect of all new building plans should be adequate storage for house coal."

During their visit to Lincoln the Duke and Duchess of Gloucester inspected the various Civil Defence Services. Among those presented were the City Gas Engineer (Mr. G. Wright) and Mr. A. Raby, senior mainlayer, 43 years' service.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Commodity Control

As a supplement to their Emergency Legislation Service, Messrs. Butterworth & Co. (Publishers), Ltd., have published an important book which reviews in narrative form the whole of the Government's control of commodities other than food, whether by Statute or by Rules and Orders. The price of the book, *Commodity Control*, is 15s. plus postage.

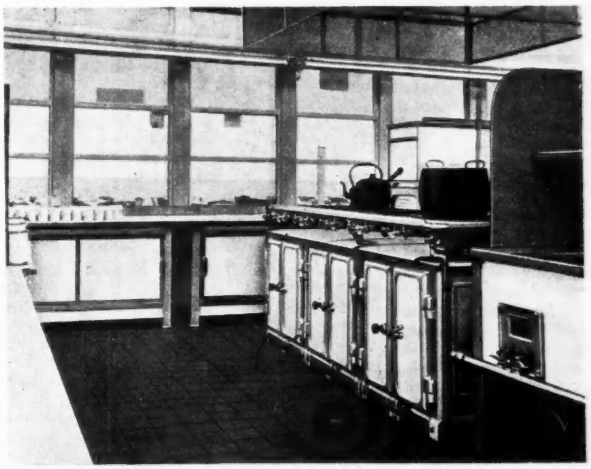
The narrative is supplemented by Appendices, of which not the least important is a complete list of all Orders and Regulations imposing, applying, relaxing, or removing controls, arranged alphabetically under the commodities or groups of commodities affected. Two advantages are claimed from this method of treating the subject. In the first place—and this is a point which may possess a great appeal to the busy and harassed industrialist—it can hardly be claimed that clarity of expression is an outstanding feature of a great part of emergency legislation, and the adoption of the narrative style enables the authors to present the effect of those provisions in a language more akin to that in use in everyday circumstances. Perhaps, however, of more importance is a second advantage—namely, that in stating in the simplest possible language the effect of the provisions of emergency legislation, it is possible to incorporate the effect of the many amending Orders which so often succeed the original provisions, and the combination of which can often harass even a specialist in the particular subject.

The book is written by J. Bray Freeman, Barrister-at-Law, and N. Howarth Hignett, Solicitor of the Supreme Court.

Making Rubber Go Farther

Before the rubber shortage became acute the Gas Industry used a good deal of rubber and for many months it has been looking for substitutes, or for some means of making the available supplies go farther, for conveyor and projector belts, the sealing of purifiers, the jointing of pipes, and other purposes. The rubber industry, too, has carried out intensive research, and one result has been the production of "Relt" by the Empire Rubber Company, Dunstable, in association with the Bury Felt Manufacturing Company, Bury. "Relt" is in effect a new rubber moulding technique wherein the mouldings consist of a core of felt surrounded by a "corral" of rubber. The new process, for which patent applications have been made, is said to save as much as 75% of raw rubber in some types of mouldings.

On one particular type of hollow cylindrical moulding originally made in a rubber mixture there has been a saving of 53% of raw rubber, or nearly 1¾ tons on a run of 100,000. The co-inventors claim that variations in the degree of resilience are more easily secured, since the felt core can be provided in a range of different degrees of hardness. Originally the felt core was made to conform only roughly to the shape of the final moulding, but it can now be pre-formed to the exact shape, although slightly smaller than the final product, with a still greater saving of rubber and more uniform resilience. The hardness and resilience of the felt core are now more variable and the products more nearly conform to the standard of mouldings produced wholly from rubber mixtures. The process is applicable not only to shaped products, but also to ply sheeting. Further developments are in hand; already "Relt" is being used where resistance to oil and petrol is necessary, and in other applications we are told it has been found more successful than other materials because it is waterproof.



An Installation by Radiation Ltd. in a Canteen at a large Engineering Works.

WORK OF THE GAS RESEARCH BOARD*

By E. V. EVANS, O.B.E.

YOU have asked me to speak upon the Gas Research Board. It has, in fact, been a long-standing arrangement with you, and it happens that the moment is most opportune to deal with a general description of the organization of the Board, of some of the work it is doing, and of what we hope to do when times generally become easier. It is opportune because it is only within recent months that the Board has become affiliated with the Department of Scientific and Industrial Research and is receiving an appreciable grant from the Government. It is now a State-aided Research Association having one object in view—that is, to give useful service to the Gas Industry.

The Department has nominated three members to serve on the Council of the Board and to represent the Government. Those three members are: Sir Lawrence Bragg, F.R.S., Cavendish Professor at Cambridge ; Professor C. G. Douglas, F.R.S., a medical man who holds the Chair of General Metabolism at Oxford; and Mr. R. O'F. Oakley, the Assistant Secretary of the Department of Scientific and Industrial Research.

I expect it will already be known to you that at the last meeting of the Council a Director of the Gas Research Board was appointed. And that the Director is none other than Dr. J. G. King, who is so well known to you. To me it seems remarkable that we should have to go to Scotland to find our Director. To you it may appear to be in the natural order of things.

The Director will have as his senior assistants a chemist—who should be what one may call a "coal processing" chemist, and a physicist. The appointment of a physicist will have to wait until more physicists become available, but we have appointed as Joint Assistant Director, Dr. F. J. Dent, who has proved himself to be an outstandingly sound investigator in the field of the processing of coal.

When this organization gets completely to work the Gas Industry will be justified in expecting considerable help and guidance from the Board.

Now all this sounds most progressive, as indeed I think it is, but we must be careful not to over-estimate the part the Gas Research Board can play in the development of the Industry. By itself the Board can do very little, for the Gas Industry must be prepared to interpret and apply its work. In passing, may I say that by " Gas Industry" is meant not only the gas undertakings, but the manufacturers of gas-works plant and of gas-burning appliances. It is useless for us of the Gas Industry to open our eyes and shut our mouths (or whatever it is) and see what the Gas Research Board will send us. We must do a good deal more than this. We must possess in the Industry not only men capable of understanding and interpreting modern research, but men in the gas undertakings and elsewhere themselves investigating their day-to-day problems, men in close touch with the Board, men who will transfer to the Board work of fundamental nature which would be better solved in a national way. You see, I sometimes get a little impatient with those who perpetually cry "Let us have more research! Let us spend more on investigations!" and do not realize that the more research done the more men must there be inside the Industry to interpret and develop it. There is already an immense amount of knowledge and research sleeping quietly in the archives of technical societies or in the technical Press that has never been used or applied. A better slogan would be, "Let us apply to industry more and more of the research work already done."

What I am saying is that the Gas Research Board can do little unless *pari passu* our Industry creates an organization capable of understanding and applying its work. The creation of such an organization is a matter to be fostered by the Institution, and in this the Gas Engineering Advisory Boards with their regional control laboratories will play, I hope, a predominant part.

The association of the Gas Research Board with the Department of Scientific and Industrial Research will not only bring an appreciable monetary grant from the Government, but will link up the research work of the Gas Industry with that of other branches of the industry and of the Government's own research organizations.

A Co-ordinating Committee of the Fuel Research Associations under the Chairmanship of Sir Harold Hartley has been formed, and upon this the Gas Research Board has nominated two representatives.

Significant though all this may be, we must not under-rate the value and importance of the research and development the Gas Industry has already achieved.

I fear the Gas Industry is not accustomed to beat its own big drum and I am only beating it now because, upon learning of the one million pounds sterling that the coal industry was intending to spend over the next five years, a certain section of our own Industry spoke disparagingly of our own effort. May I say, before the war our Industry was spending at the rate of at least two million pounds in five years upon research and development. Of course, I realize that the amount of money spent on research does not indicate the value of the results obtained. Yet we may be justly proud of our research and development work. Apart from economies arising in the manufacture of gas and coke due to a better understanding of the carbonization process and to the erection of more efficient gasmaking and water-gas making plants, development of gas appliances has enabled the gas user to obtain the same, or better results with one-third to one-quarter less gas. With an average yearly gas bill of £3 this means the possibility of saving a further 15s. to 20s. a year. All this does not take into account the greater convenience of modern gas appliances, the oven thermostat, the gas refrigerator, the multipoint and storage water heaters, and many other familiar appliances. Industry, too, has received great benefit from better design of furnaces and other equipment. Tar used for the construction and maintenance of roads has been changed in property to meet the increasing severity of the demands made by modern traffic. Coke has taken its place as a domestic smokeless fuel, and the gas-ignited solid fuel fire has solved the domestic problem of fire-lighting.

I say again we must never disparage the work that our Industry has done for itself in the past. And the contribution that will now come from the taxpayer is infinitesimal compared with that made by the Industry itself in the past.

Although The Institution of Gas Engineers and the University of Leeds have played an important part in the developmental work, a great deal, and I think the majority, has come from the individual effort of gas undertakings and of plant and appliance manufacturers. Please do not think that in future the Gas Research Board will do this work and that individual effort may slacken. I assure you it is quite the reverse. The Gas Research Board will occupy itself mainly with long-distance work. Work connected with the Gas Industry of the future. The newer methods of processing coal, or the nature of radiant heat suited to particular operations, or the study of flame, or the generation of power from explosive gases. And here I return to my original theme. Our Industry must equip itself to do more and more day-to-day research and development work, depending upon the Gas Research Board to co-ordinate—to a reasonable degree—the work and taking over those problems of long distance and fundamental work that are best solved in a national way.

The Board will in time, I trust, possess its own experimental station and its own information bureau. It will be the servant of the Gas Industry, and here again you will remember that the Gas Industry is not confined to gas undertakings. Work which can be better carried on at a University where there exists a particular expert school of thought and experience (as at Leeds) will be placed at that University. It may well be that the Board will place certain of its problems in the laboratories of gas undertakings or the laboratories of plant or appliance manufacturers. If such a procedure were adopted the cost would be borne from the funds of the Board, and the result of the investigation would be made available to its members.

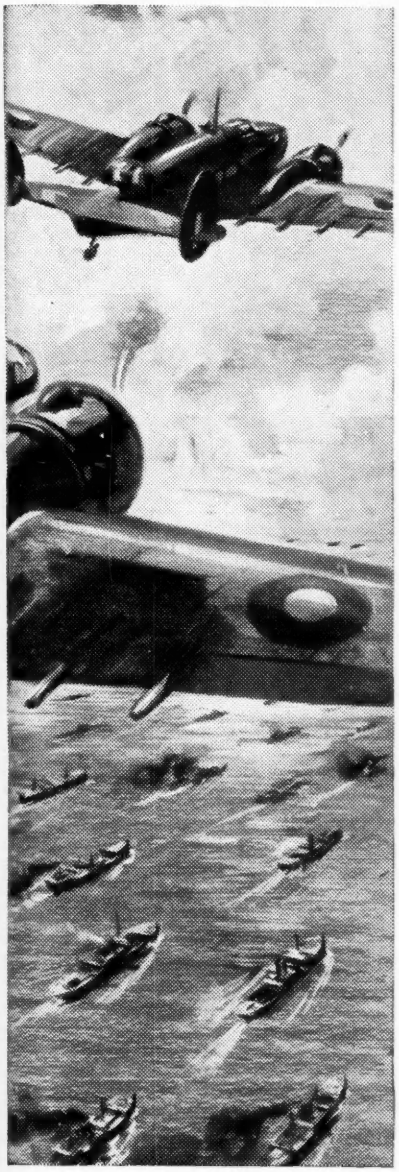
I am hoping that the organization set up under war conditions, and represented by the Regional Gas Engineering Advisory Boards, may find a permanent place in the structure of the Gas Industry. Should this prove to be so the establishment of regional servicing laboratories would appear to be a natural and desirable development. Such laboratories, which would be under regional control, might be expected to assume responsibility for the testing of plant, processes, and appliances, as well as dealing with the day-to-day problems of the regions. With work of this nature the Gas Research Board would not normally be concerned (but should maintain such contact as would ensure effective co-ordination), except to ensure that new knowledge so gained should be made known throughout the Industry, and that problems arising in the course of the work were adequately investigated. This might on occasion require that the Board should accept responsibility for special tests of processes or apparatus, but it is undesirable that any large proportion of the Board's resources should be so expended. The Board, through the work of its own staffs, and by the support of researches conducted in suitably chosen laboratories, should elucidate the fundamental principles of coal processing, and of the utilization of all products from coal processing. The practical application of these principles is more likely to be made effective by the work of the laboratories of the gas undertakings in collaboration with the technical staff of plant and appliance manufacturers. Nevertheless, the Board would not refrain from undertaking development work to any required extent if it seems to be in the best interests of the Industry to do so.

Although this matter of organization may be of interest to you, I believe you will find greater interest in a brief consideration of one or two of the technical ideas which have formed the background of the work of the Board in recent times. In presenting these technical ideas to you in a manner which I think is best understood by engineers whose main occupation in life is the wartime production and supply of gas, you will, I am sure, understand that it is a personal interpretation and is not an official statement from the Council of the Board.

On another occasion I have said that there are four outstanding requirements of our coal-processing industry that should tend to allow gas, or gas and coke, to play a more and more important part

* Address to the North British Association of Gas Managers, April 9.

guarding the flock ...—



From the ends of the earth they come . . . .
our precious ships and their brave crews
through peril of storm stalked by wolves
the wolves of the sea—
the U-boats in packs.
But the Navy is there—
and overhead the planes—
spotting—
bringing the convoy Home with its urgent load.
Food, raw materials, Oil for the tanks,
Munitions—
to feed the gathering force of the great assault—
the final blow !
Precious cargoes, precious men—
and the wolves are many.
They multiply, they swarm.
They prowl ceaselessly.
But the convoy comes home,
for our planes are overhead spotting, swooping,
striking—
guarding the flock.

* * *

What are we on the home front doing in the war against the U-boats? It is our part to work harder and to save more . . . . to stop waste, to save food and fuel and CUT OUR SPENDING. That is the vital support which we must give to the seamen and the airmen who risk their lives for us. The great thing at this moment when the dawn is breaking is to SAVE MORE.

...— Wings for Victory

SPACE GIVEN BY THE WOODALL-DUCKHAM CO., EPSOM ROAD, GUILDFORD (Tele: GUILDFORD 3301.)

Issued by the National Savings Committee

PRODUCTS INDEX

WHO MAKES IT

Here you find a weekly listing of hundreds of products with the names and addresses of manufacturers. The advertisements of these companies appear in The Iron Age.

Abrasives—Coated
Carborundum Co., The, Niagara Falls, N. Y.
Clover Mfg. Co., Norwalk, Conn.

Abrasives—Polishing
Abrasive Co., Philadelphia, Pa.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
General Abrasive Co., Inc., Niagara Falls, New York.
Norton Co., Worcester, Mass.
Siefen, J. J. Co., Detroit, Mich.

Abrasives—Steel Shot and Grit
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Harrison Abrasive Corp., Manchester, N. H.
Pangborn Corporation, Hagerstown, Md.
Pittsburgh (Pa.) Crushed Steel Co.
Steel Shot & Grit Co., Boston, Mass.

Accumulators
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.
Morgan Engineering Co., The, Alliance, Ohio.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

Acetylene
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

Acids—Pickling
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Air Conditioning Equipment
American Blower Corp., 6000 Russell St., Detroit, Mich.

Alloys—See Ferroalloys

Alloys—Bismuth
Cerro De Pasco Copper Corp., 44 Wall St., New York City.

Alloys—Copper
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Milwaukee, Wis.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

Alloys—Corrosion & Abrasion Resistant
Coast Metals, Inc., Canton, Ohio.
Wall-Colmonoy Corp., Detroit, Mich.

Alloys—Low Melting Matrix
Cerro De Pasco Copper Corp., 44 Wall St., New York City.

Alloys—Magnesium
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Alloys—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Milwaukee, Wis.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

Alloys—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Aluminum
Aluminum Co. of America, Pittsburgh.

Angles, Beams, Channels and Tees
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Tennessee Coal, Iron & Railroad Co., (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

Annealing Boxes
Lebanon (Pa.) Steel Foundry.
United Engineering & Fdry. Co., Ptgh.

Arbors
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

Asbestos
Carey, Philip, Mfg. Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St., N. Y. C.

Babbitt Metals
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
National Bearing Metals Corp., Pittsburgh, Pa.
National Lead Co., 111 Bdway., N.Y.C.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

Balancing Equipment
Gisholt Machine Co., Madison, Wis.
Sundstrand Machine Tool Co., Rockford, Ill.

Baling Presses
Baldwin-Southwark Div., Baldwin Locomotive Wks., Philadelphia, Pa.
McKay Machine Co., The, Youngstown, Ohio.

Balls—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.

Balls—Steel
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Fafnir Bearing Co., The, New Britain, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Strom Steel Ball Co., Cicero, Ill.

Barrels—Burnishing & Tumbling
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Whiting Corp., Harvey, Ill.

Bars—Aluminum
Aluminum Co. of America, Pittsburgh.

Bars—Brass, Bronze or Copper
American Brass Co., The, Waterbury, Conn.
Bunting Brass & Bronze Co., The, Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

Bars—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Crucible Steel Co. of America, Chrysler Bldg., New York City.
Jones & Laughlin Steel Corp., Pittsburgh.
Kidd Drawn Steel Co., Aliquippa, Pa.
Rathbone, A. B. & J., Palmer, Mass.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

Bars—Concrete, Reinforcing
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Nicetown Plate Washer Co., Inc., Philadelphia.
Republic Steel Corp., Cleveland, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Wickwire Brothers, Inc., Cortland, New York.

Bars—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Bars—Steel
Andrews Steel Co., The, Newport, Ky.
Beals-McCarthy & Rogers, Inc., Buffalo, New York.
Bethlehem (Pa.) Steel Company.
Brown-Wales Co., Boston, Mass.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., New York City.
Great Lakes Steel Corp., Ecorse, Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago, Ill.
Midvale Co., The, Nicetown, Phila., Pa.
Potts, Horace T., Co., Philadelphia, Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

Batteries—Storage
Edison Storage Battery Div. of Thomas A. Edison, Inc., West Orange, N. J.
Electric Storage Battery Co., The, Phila.
Philco, Battery Div., Phila., Pa.

Battery Chargers
Cutler-Hammer, Inc., Milwaukee.

Beams—See Angles

Bearings—Babbitt
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

Bearings—Ball
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Torrington (Conn.) Company.

Bearings, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., The, Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Moraine Products Div. of General Motors Corp., Dayton, Ohio.
National Bearing Metals Corp., Pittsburgh.
Shenango-Penn Mold Co., Dover, Ohio.

Bearings—Needle
Bantam Bearings Corp., The, South Bend, Ind.
Torrington (Conn.) Company.

Bearings—Oilless
Bunting Brass & Bronze Co., The, Toledo, O.
Moraine Products Div. of General Motors Corp., Dayton, Ohio.
Rhoades, R. W., Metalline Co., Inc., Long Island City, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

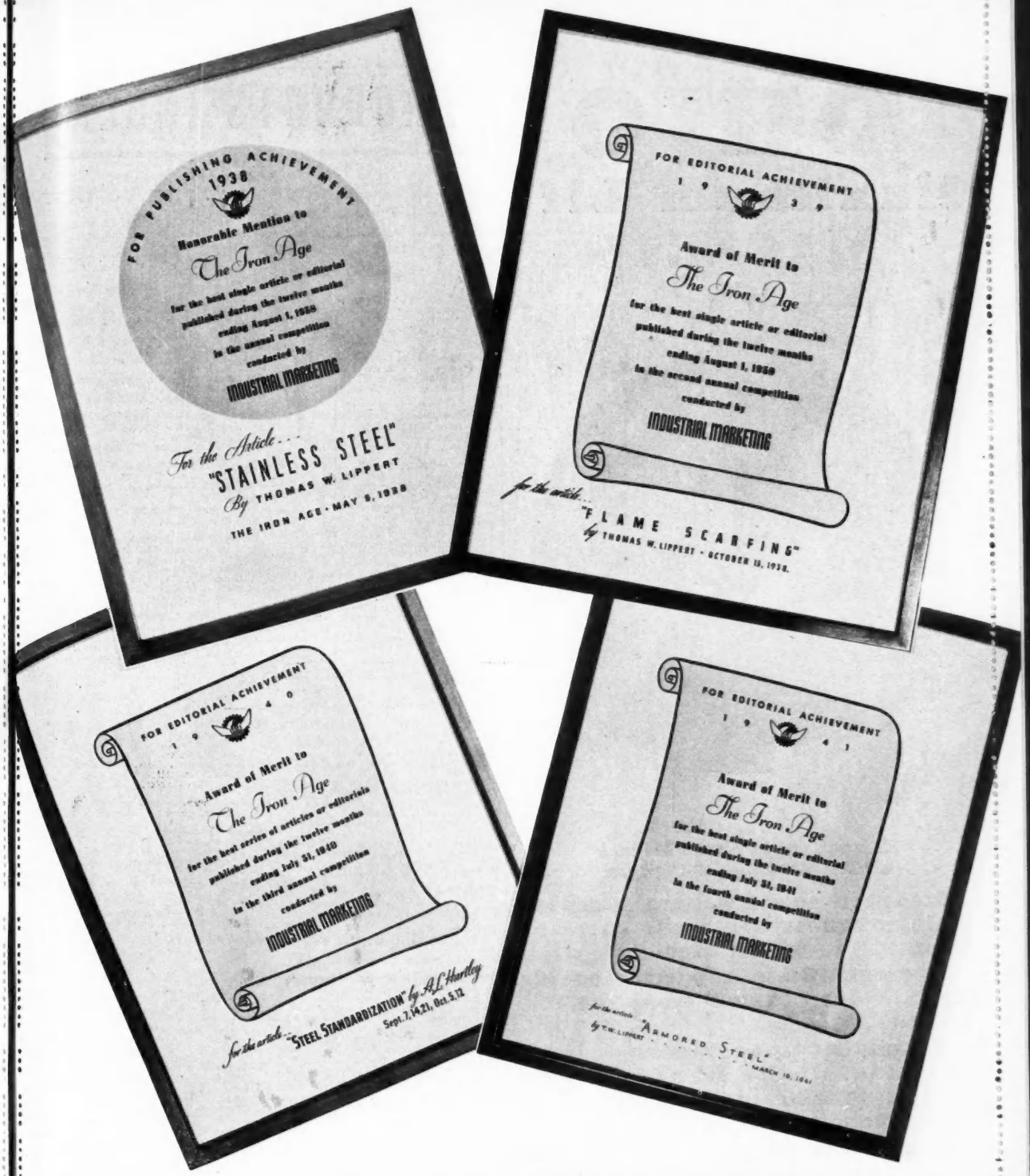
Bearings—Roll Neck
Bantam Bearings Corp., The, South Bend, Ind.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

Bearings—Roller
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., Syracuse, N. Y.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

Bearings—Roller Tapered
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Timken Roller Bearing Co., The, Canton, O.

Bearings—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Ind.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

Bearings—Shaft Hanger
Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., The, New Britain, Conn.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., Syracuse, N. Y.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Triangle Mfg. Co., Oshkosh, Wis.

Bearings—Thrust
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.

FOR PUBLISHING ACHIEVEMENT
1938
Honorable Mention to
The Iron Age
for the best single article or editorial published during the twelve months ending August 1, 1938 in the annual competition conducted by
INDUSTRIAL MARKETING
For the Article...
"STAINLESS STEEL"
By THOMAS W. LIPPERT
THE IRON AGE · MAY 5, 1938
FOR EDITORIAL ACHIEVEMENT
1939
Award of Merit to
The Iron Age
for the best single article or editorial published during the twelve months ending August 1, 1939 in the second annual competition conducted by
INDUSTRIAL MARKETING
for the article...
"FLAME SCARFING"
by THOMAS W. LIPPERT · OCTOBER 19, 1939.
FOR EDITORIAL ACHIEVEMENT
1940
Award of Merit to
The Iron Age
for the best series of articles or editorials published during the twelve months ending July 31, 1940 in the third annual competition conducted by
INDUSTRIAL MARKETING
for the article... "STEEL STANDARDIZATION" by A. L. Hartley
Sept. 7, 14, 21, Oct. 5, 12
FOR EDITORIAL ACHIEVEMENT
1941
Award of Merit to
The Iron Age
for the best single article or editorial published during the twelve months ending July 31, 1941 in the fourth annual competition conducted by
INDUSTRIAL MARKETING
for the article "ARMORED STEEL"
by T. W. LIPPERT
MARCH 10, 1941

Now it's a "QUARTET"

★ ★ Again in 1941 The Iron Age was honored with an award for editorial excellence in the annual contest sponsored by Industrial Marketing. ★ ★ This time the judges selected the article, "Armored Steel" by Managing Editor, T. W. Lippert, published in the June 5 issue. ★ ★ That makes it four in a row, one for each year the contest has been held—a batting average of 1.000.

MAY 11 1943

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5908 Maurice Avenue
Cleveland, Ohio

PRODUCTS INDEX

New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., Syracuse, N. Y.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Timken Roller Bearing Co., The, Canton, O.

Belt—Conveyor, Elevator
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

Belting—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Houghton, E. F., & Co., Philadelphia, Pa.

Belting—Metal, Conveyor, High and Low Temperature
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Belting—Rubber
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

Belts—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Multiple V-Belt Drive Assn., Chicago, Ill.

Bench Legs—Steel
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

Benches—Steel Work
Standard Pressed Steel Co., Jenkintown, Pa.

Bending Machines—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

Bending Machines
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The, Steelweld Mchry. Div., 1115 East 283rd St., Wickliffe, Ohio.
Cleveland (Ohio) Punch & Shear Works Co., The.
Dreis & Krump Mfg. Co., Chicago, Ill.
Niagara Machine & Tool Works, Buffalo, N. Y.
Yoder Co., The, Cleveland, Ohio.

Benzol Recovery Plants
Koppers Co., Engineering & Construction Div., Pittsburgh.

Beryllium Copper
American Brass Co., The, Waterbury Conn.
Ampco Metal, Inc., Milwaukee, Wis.

Billets—Alloy & Carbon Steel
Alan Wood Steel Co., Conshohocken, Pa
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Copperweld Steel Co., Warren, Ohio.
Harrisburg (Pa.) Steel Corp.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
Pittsburgh (Pa.) Steel Co.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Billets—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Pittsburgh (Pa.) Steel Co.
Republic Steel Corp., Cleveland, Ohio.

Billets—Re-rolling Facilities
Nicetown Plate Washer Co., Inc., Philadelphia, Pa.

Blacking Salts, for Steel
Alrose Chemical Co., Cranston, Providence, R. I.
Heatbath Corp., Springfield, Mass.
Mitchell-Bradford Chemical Co., The, Bridgeport, Conn.

Blast Cleaning Equipment
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., The, Chicago, Ill.
Pangborn Corporation, Hagerstown, Md.
Ruemelin Mfg. Co., 3870 N. Palmer St., Milwaukee, Wis.

Blast Furnace Plants—Complete
Brassert, H. A., & Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland.

Blast Furnace Specialties
Bailey, Wm. M., Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland.

Blast Gates
Rockwell, W. S., Co., 50 Church St., N. Y. C.

Blocks—Chain
Ford Chain Block Div. American Chain & Cable Co., Inc., Philadelphia, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

Blowers
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Blower Corp., 6000 Russell St., Detroit, Mich.
North American Mfg. Co., The, Cleveland, Ohio.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.

Blowpipes—Soldering, Heating
American Gas Furnace Co., Elizabeth, New Jersey.
Weldit Acetylene Co., Detroit, Mich.

Blue Printing Machines & Paper
Pease, C. F., Company, The, 2695 W. Irving Pk. Road, Chicago, Ill.

Boilers
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

Bolt and Nut Machinery
Ajax Mfg. Co., The, Cleveland, Ohio.
Hill Acme Co., The, Cleveland, Ohio.
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, Cleveland, Ohio.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

Bolt & Rivet Clippers
Helwig Mfg. Co., St. Paul, Minn.

Bolts—Special
Bethlehem (Pa.) Steel Co.
Cleveland (Ohio) Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Bolts—Stove
Cleveland (Ohio Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
Progressive Mfg. Co., Torrington, Conn.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Bolts—Stove, Recessed Head
American Screw Co., Providence, R. I.

Bolts—Track
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Lamson & Sessions Co., The, Cleveland, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Bolts and Nuts
American Screw Co., Providence, R. I.
Bethlehem (Pa.) Steel Company.
Clark Bros. Bolt Co., Millidale, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Lamson & Sessions Co., The Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Rhode Island Tool Co., Providence, R. I.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., Cleveland.

Boring Bars
Bullard Co., The, Bridgeport, Conn.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.

Boring, Drilling & Milling Machines—Horizontal
Giddings & Lewis Machine Tool Co., Fond Du Lac, Wis.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

Boring & Drilling Machines—Vertical
Bullard Co., The, Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, New York.
National Automatic Tool Co., Richmond, Ind.

Boring Machines—Diamond & Carbide Tools
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Heald Machine Co., The, Worcester, Mass.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Boring Machines—Jig
Cincinnati (Ohio) Bickford Tool Co., The